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Coal Age

Volume 45 Number 1

Annual Review and Progress Number, Coal Age's 29th, off the press in February, highspots cost-cutting advances for the entire country during the past year. Usually representing the editorial contributions of about 500 coal operators, the review this year will boil down the returns from inquiries sent to 1,600 companies operating 3,000 mines, or more than three times the number previously surveyed. . . . **Clemens Coal Co.** No. 22 mine is double-featured in this number. Dealing with the unusual method of building up the fine-size ash content to improve the fusion temperature of the product, cleaning-plant practice is outlined, p. 41. Stripping equipment and methods used to recover and transport the 3-ft. seam to the plant, begins on page 49. . . . **Anthracite's** solutions to mining and preparation problems are constantly told in Coal Age columns. This issue, p. 54, the story of the more efficient Pittston No. 9 breaker is given, and following up the November, 1939, Hazleton shaft-bottom article, the how and why of the shaft itself will be published in an early number. . . . **Speaking of shafts,** Vesta Coal Co. cast about for a cheaper way of bringing mine rock to surface and found that by

CONTINUED ON PAGE 7

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COAL AGE (with which is consolidated "The Colliery Engineer" and "Mines and Minerals") is published monthly on the 1st. $3 per year in the United States, Canada, Mexico, Central and South America; other countries, 25 or 30 shillings. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U. S. A. Cable address: "McGrawhill, N. Y." Member A.B.P. Member A.B.C.

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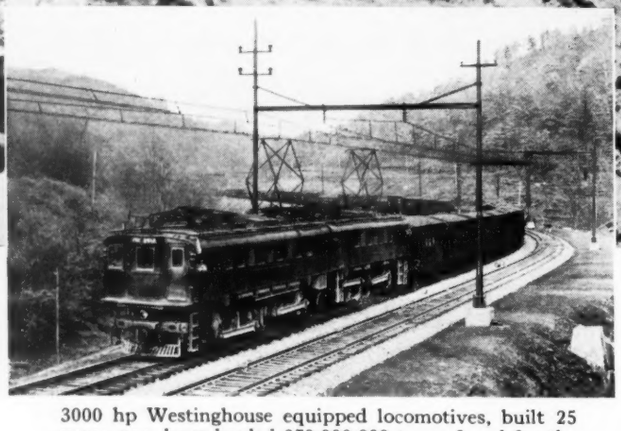

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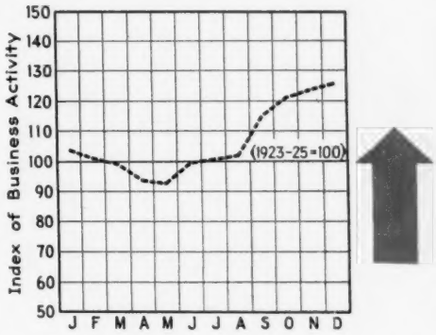
ELECTRICAL PARTNER OF THE MINING INDUSTRY

sinking a new 513-ft. opening and equipping it with modern facilities for hoisting and waste handling a substantial cost saving could be made; see p. 58. . . . **Our Canadian associates,** meanwhile, also are doing things to improve their efficiencies. At Western Dominion Coal Mines, Ltd., in Saskatchewan, the age-old question of how best to lift coal from a lightly covered seam to surface has been answered to their satisfaction by installing an 800-ton-daily-capacity bucket elevator in a vertical shaft. A mobile loading machine produces part of this tonnage. For description see p. 39. . . . **U.M.W. of A.** holds its 50th anniversary meeting in Columbus, Ohio, late this month and Coal Age will be on the job to report it with a post-convention summary in the February issue. . . . **Transporting** speedily and safely 2,300 cars to shaft bottom in seven hours, is just one of the jobs done every day at New Orient mine. How it is accomplished is told, p. 35. . . . **Coal Age front cover,** highlighting the 1939 close of lake coal tonnage shipments—estimated to be more than 41,000,000 tons and coming close to the top—has been recorded in spite of the fact that coal production almost ceased for six weeks. This Coal Age cover has been released for editorial use through the courtesy of Electric Storage Battery Co., whose ad occupied this spot last January.

HOW'S BUSINESS

GENERAL BUSINESS ACTIVITIES

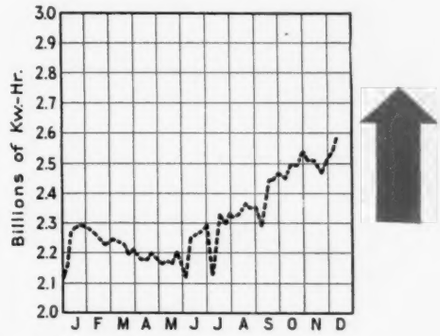
Improvement in business has been quite apparent since May, and the index has increased 35 per cent in that period, according to the figures of *Business Week*. Some of this advance is, however, seasonal, and some other improvement shows signs of smoothing off in the early months of the year. But there is evidence that industry is about to sail again with a favoring breeze—quite a relief after the deadly doldrums with which we have been afflicted.



October-November, preliminary; December, estimated.

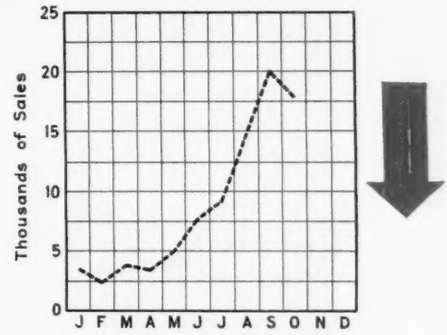
ELECTRICAL POWER PRODUCTION

A change of 11.5 per cent over the production of a year ago in the electrical light and power industry was shown by the Edison Electric Institute early in December in its weekly report, and much of that increase had to come from fuels and steam, for the water supplies were low. The increase in power use of the Central Industrial Region led—14.6 per cent up from a year ago.



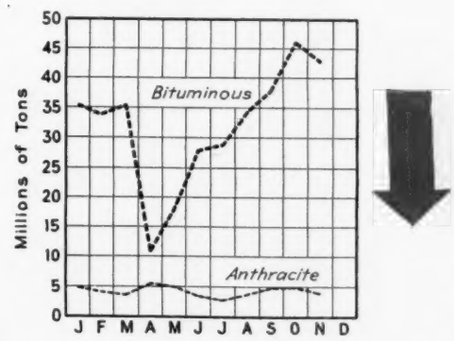
COAL-STOKER SALES

Mechanical-stoker sales in the United States in October last totaled 18,222 units (U. S. Bureau of the Census from 101 manufacturers), compared with 20,938 units in the preceding month and 17,681 in October, 1938. Sales of small units in October last were: Class 1 (under 61 lb. of coal per hour), 15,917 (bituminous, 13,976; anthracite, 1,941); Class 2 (61-100 lb. per hour), 1,068; Class 3 (101-300 lb. per hour), 861.



COAL PRODUCTION

Tonnages of both anthracite and bituminous coal have fallen recently consequent on both the flurry which occurred in September and October and the moderate weather that marked November. The anthracite production of 1939 may prove to be 12 per cent higher than in the previous year, and bituminous production 13 per cent higher, reflecting improved industrial activity and perhaps inroads by drought on hydro-electric power. Tonnages are from the Interior Department.



December, preliminary.

STREAMLINE

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.

SYDNEY A. HALE, Editor • JANUARY, 1940

Pertinent and Impertinent

• DISTRICT BOARDS still continue to present evidence to support protests on proposed minimum bituminous coal prices. Will the finals be final this year?

• WILL well-conceived promotion efforts click in coal? Chicago coal and stoker interests joined recently in advertising a model home with a modern domestic stoker installation. On the day this house was thrown open to public inspection over 3,500 people visited it. And this in the first week of December!

• WHILE American exporters cast eager eyes at foreign markets normally served by the European belligerents, the British Government intimates that it will be necessary to increase its national coal output 10 to 15 per cent. Evidently coal producers in this country are not going to be handed world markets on the proverbial silver platter.

• AMERICAN mechanization enthusiasts who indulge only in superlatives should shun British statistics. The figures would be upsetting to their vanity. Great Britain in 1938 handled 123,000,000 gross tons—or 54 per cent of its output—by underground conveyors. Fifteen years earlier the conveyor total was only 28,000,000 tons, or 12 per cent of the 1923 production. On mobile loaders, the United States is far in the lead, but in the total percentage of output mechanically loaded Great Britain has a distinct and wide edge.

• CONTINUOUS modernization is as essential in progressive publishing as in modern coal mining. In keeping with that doctrine, this issue of COAL AGE comes out in a more streamlined dress. Type faces have been changed and pages opened up to make reading easier and faster. Headlines have been redesigned. Through the cooperation of manufacturers who already had contracted for the space, advertising disappears from the front cover and that page becomes a town crier for the editorial wares of the issue. A new feature, "How's Business," makes its bow on page 7. We hope you'll like the new format.

• THAT BRITISH producers expect to hold their export business regardless of war conditions is evidenced by the attention being paid to several cargoes of coal which have been shipped to Argentina and Brazil from the United States. Shall we sharpen our pencils and go after the business or let them have it?

• GOVERNMENT-OWNERSHIP advocates may continue to plug for hydro-electric generation of power financed by the federal treasury. Privately owned utilities that are compelled to justify their expenditures both to regulatory commissions and to their own stockholders, however, continue to favor low-cost coal-burning steam plants. New plants in this category completed last year or planned for this year and next will add 3,000,000 kilowatts to public-utility capacity.

• WAR is a trial and tribulation in more ways than one. Citing some of its red tape as particularly galling, the *Colliery Guardian* recently excoriated—in its usual gentlemanly manner—the "new-fangled bureaucracies" set up to deal with British war-time conditions. "Much of the

trouble" which the British coal industry must endure, states our contemporary, "arises from the fact that a bureaucracy like that which is ruling us, without any obvious directional policy, is full of square pegs in round holes and, suffering as it must from an inferiority complex, is prone either to play for safety, to make haphazard decisions or to revoke them as suddenly without rhyme or reason." Could our own coal industry draw any conclusions as to possible bureaucratic administration from the current experiences abroad?

• CERTAIN hard-headed realists take delight in looking down their noses when the possibilities of expanding the markets for coal as a raw material are discussed. Yet, according to Dr. James K. Hunt, of the duPont organization, over 46,000,000 tons of bituminous coal was used for chemical purposes alone in 1938. Just a mere matter of one ton out of every seven and one-half produced that year.

Smoke Abatement

THAT COAL, properly burned, gives off no more smoke than any other fuel is a fact well known to the combustion engineer. But general consumer education is still sadly needed. In some places, as a recent National Coal Association bulletin points out, all smoke is ascribed to coal and the public is told that "coal as a fuel is not proper." Obviously, such statements prejudice an uninformed public against the continued use of coal for heating and power purposes and pave the way for discriminatory local regulations.

Cooperation of the industry with municipal agencies to eradicate such false impressions and prevent the enactment of unfair legislation is clearly indicated. One great handicap to such cooperative effort, however, is the fact that few cities have set up the proper agencies and in still fewer are such agencies adequately staffed. A recent check shows that in only three out of eighty cities with a population of more than 38,000 are the officially designated smoke-abatement departments functioning as such. Only five such departments have seven or more full-time employees; sixty-three cities have one or less employee giving his full time to smoke-abatement problems.

If the desired cooperation is to be attained on any broad scale, it is patent that this situation must be changed. As a starter, it might be well for the industry to initiate a campaign for the establishment of adequately financed and properly staffed smoke-abatement commissions in each capital city. Such a campaign would achieve two definite objectives: it would demonstrate to the public that the coal industry is genuinely interested in combating air pollution and, in the measure that it was successful, it would give the industry recognized authorities with whom to cooperate in order to intelligently promote further expansion of all coal markets.

Return to Sanity?

RECENT developments in the prolonged hearings on proposed minimum bituminous coal prices suggest that the regulatory authorities are beginning to realize that the consumer has the last word. When the proposed schedules were first published, it looked as if some districts were determined to penalize ex-river shippers and consumers. This penalization was to be effected through higher mine prices on coal so shipped than on coal moving all-rail. Producers and consumers of ex-river coal naturally protested long and loudly.

Bituminous Coal Division officials insist that the prices originally proposed "would have permitted producers" of such coal "to pass on the savings" due to lower transportation costs "to the great preponderance of the river-carried coal." It is significant, however, that the division is now recommending additional downward revisions. Acceptance of these recommendations, it is stated, would make it possible to pass along such savings "to numerous additional consumers along the Ohio and Mississippi River systems."

The latest recommendations are a frank recognition of the right of the consumer to enjoy his natural advantages of location. But there are other advantages which the proposed schedules seek to destroy. Low-cost efficient producers are penalized to carry the burden of high-cost operations and the latter, under the averaging scheme, are pushed further into the red. How long before the division will recognize that situation and abandon attempts to deprive the consumer of the benefits of low-cost tonnage?

Again the Goat

SO THE coal industry is to be offered as a sacrifice on three altars —foreign trade, "good neighborliness" and employment for seamen. On these three specious grounds we must take oil from Venezuela that we do not want, must deprive our miners of the work they need so much and must still further constrict the production of our own oil fields. Like many ardent shoppers, we have developed an unhealthy desire to buy whether we need the goods or not. The power of suggestion has completely hypnotized us.

Coal miners are as much entitled as American sailors and Venezuelans to the jobs open to them, and the administration is not justified in taking action to deprive them of these rights. With fewer vessels to meet the needs of commerce and with trade likely to be more active than in the pre-war period, shipping should be more, rather than less, busy in the coming months than it was during the past year.

2,300 CARS IN 7 HOURS

Delivered With Speed and Safety

By the New Orient Transportation System

With a normal daily output of 10,000 tons, New Orient mine must land 2,300 loaded cars on the bottom in seven hours. Measures which make this possible with the maximum safety include separate main lines for empties and loads, good track (with welded joints and treated ties), good roof support in haulageways (steel, treated wood and gunite), dispatcher control, switch-position signals, warning signals to indicate blocked track, etc. Joint welding was started in 1936, and on 104 test joints the cost was $5.245 each, compared with $6.56 for an angle-bar-and-bond joint over the life of the track.

By B. K. WENTWORTH
Assistant to the Superintendent
And A. G. SHAFFER
Chief Underground Electrician
New Orient Mine
Chicago, Wilmington & Franklin Coal Co.

WITH a normal daily output of 10,000 tons, the transportation system at New Orient mine of Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., is set to deliver an average of 2,300 loaded mine cars to the shaft bottom in seven hours. Realizing that the haulage system is the life stream of the mine, the property has been developed so that a minimum of main-line entry will have to be maintained during the life of the operation. Cross entries have a comparatively short life, thus eliminating the building and maintenance of expensive haulage roads. And, in order to handle the large number of loaded and empty trips, both loaded and empty haulageways in separate entries are employed. Welding of rail joints was inaugurated in 1936.

Coal is gathered at the face and placed on the inside partings at New Orient just as in every other mechanized mine. From these partings on the cross entries it is tranferred by 10- and 13-ton locomotives in trips of 18 to 26 cars, depending on the grades in the cross entries, to large partings on the main line. Fifteen- to 20-ton locomotives handle trips of 35 to 45 cars from the main-line partings to the bottom.

Portable Sets Used

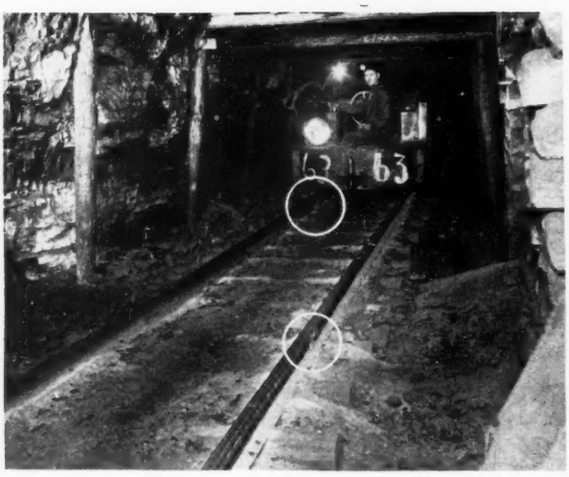
To maintain efficient voltage in the working territory, alternating current at 4,000 volts is distributed to portable motor-generator sets located at the approximate load center in each cross entry. Main-line power requirements are taken care of through permanently located motor-generator sets. Location of the main-line sets is determined by the requirements of the haulage system. Portable sets make it possible to keep the power units close to the working faces as the territory advances. The cost of moving these portable sets is low and a minimum of time is required.

Haulage entries are 12 ft. wide and 7 ft. high. The track, on a gage of 42 in., is laid in the center. Main-line loaded track is 80-lb. steel on 6 x 7-in. treated ties 6 ft. long. Main-line empty track is 70-lb. steel on the same kind of ties, and cross-entry track is 70-lb. steel on 5 x 6-in. treated ties 6 ft. long. Panel entries and room switches are 30-lb. steel on 5 x 6-in. x 6-ft. untreated ties with rooms laid the same size steel but on steel ties. When wood ties are used the coal bottoms are taken up and the ties laid on the fireclay. All main-line and cross-entry tracks are ballasted and tamped to grade. Creosoted ties were installed in New Orient from 1922 until 1934. Because of the possibility of burns and skin infection resulting from handling creosoted timber, we changed to the zinc-chloride treatment in 1934. Less than 5 per cent of the creosoted ties have been replaced because of decay and none of the zinc-chloride treated ties have been replaced to date.

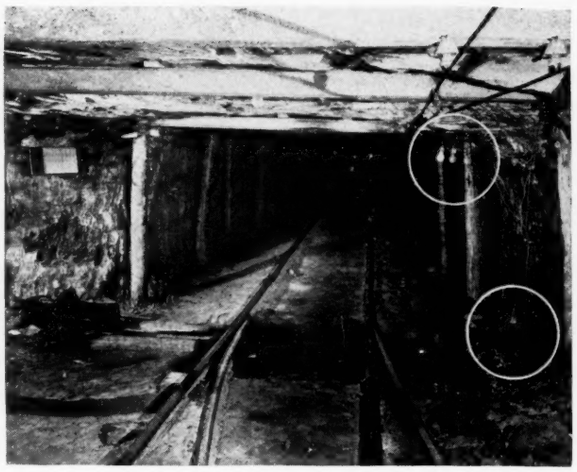
Minimum Radii 70 Ft.

A.S.C.E. rail sections are used throughout the mine. Minimum radius of curves on main lines is 70 ft. No. 3½ frogs are the minimum used on main-line turnouts, while room switches are laid with No. 2½ frogs. When worn, all main-line frogs are built up in place with a high-carbon rod, using resistance welders developed at the mine. Under average conditions, one man will build up four No. 3½ frogs in 7 hours, using an average of 10 lb. of rod per frog. Worn crossovers are built up the same way.

To get the benefits of better rail condition, lower maintenance and permanent electrical conductivity, welded rail joints were tested out in June, 1936, using the Thermit process.



This 20-ton main-line locomotive is pulling a trip of cars over a roadway with welded joints and treated ties. One welded joint is in the left-hand rail under the locomotive while another is in front of the locomotive in the right-hand rail.



One of the remotely controlled switchthrowers in use at New Orient. At the right is a switch box to show switch direction and condition. As can be seen, the switches are cocked and consequently the red signal light is burning as a warning.

To date, about 2,000 ft. of track has been welded and eventually all the main line will have welded joints. As compared to joints with angle bars and copper-weld bonds, the material cost of the welded joint is practically the same, whereas the labor of installing a welded joint is about 56c. more on the basis of experience to date. The advantage of the welded joint over the standard angle-bar-and-bonded joint is that the welded joint requires no maintenance and has the electric-conductivity characteristic of a continuous rail. The track is as smooth at the joints as in the middle of the rail, which means less wear and tear on the rolling stock, no loss of traction at the joints and therefore less use of sand and, finally, less wear on the rails with consequent longer track life.

From the standpoint of electrical conductivity, the welded joint, for all practical purposes, is the same as regular rail, which means that joint resistance is eliminated. Consequently, using the standard handbook figures of 70 joints per 1,000 ft. of track and 5 ft. of rail as the equivalent of one bonded joint, 1,350 ft. of welded track has no more resistance than 1,000 ft. of copper-bonded track. Thus, there is a sizable saving in both demand and energy charges in the course of a year. Finally, no electrical maintenance or replacement of bonds is necessary, as none are used.

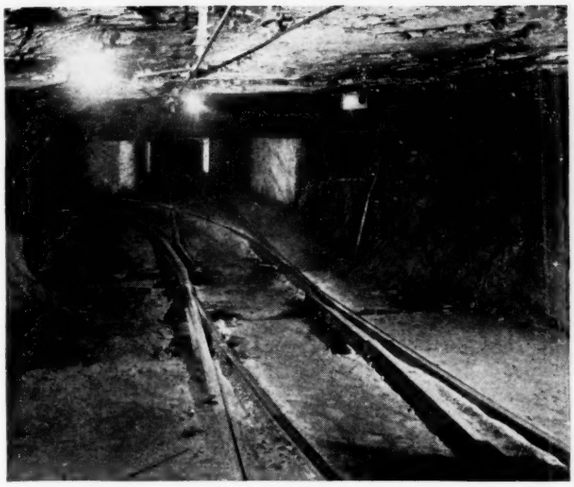
In welding track by the Thermit process, six-man crews are used at New Orient. To prepare for welding, about all that is necessary is to take off the angle bars and bonds and clean out the ballast under the joints. New track is brought to grade, ties are laid and rails placed, but not spiked. In actual welding, one man prepares the joints (lines rails and puts on the clamps); two men put on the forms, preheat the joint and set off the Thermit charge; one man takes off the forms or molds, and cleans the joints; one man makes the molds, and the sixth man helps wherever necessary. This crew has made as many as 36 joints in a seven-hour shift at a labor cost of about $1 per joint, as compared with the average of $1.76 for 104 joints on which the data in Table I are based. Generally, welding is an idle-time job. Finished joints so far have been made by grinding, but the use of a pneumatic chisel is now under consideration. The initial cost of 104 Thermit-welded joints is itemized in Table I, and this table shows the comparative initial and maintenance cost of the angle-bar joint.

Where roof support is required on main-line haulage roads, steel and wood crossbars or guniting is used. Usually, when height is available, treated timbers on treated legs are used. In addition to regular timbering, guniting has been resorted to in several cases where heavy cuts have been made in bad roof and also in one particularly heavy cut into the bottom. Gunite prevents continuous sloughing when the exposed surface is susceptible to air.

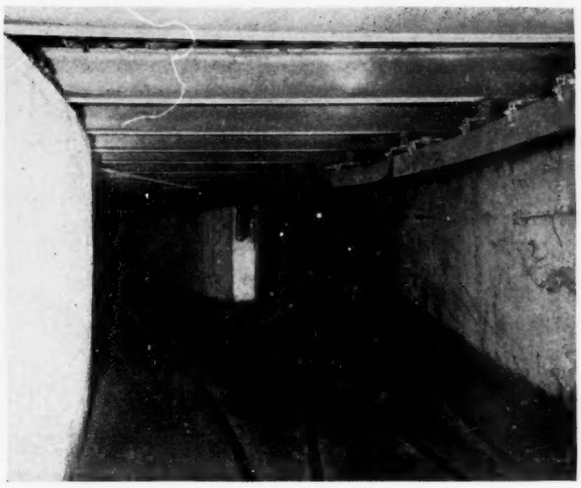
The first guniting was done on the main shaft bottom in 1922 and later was extended to the haulage roads. All that is necessary to gunite a place

Table I — Comparative Initial and Final Costs of Welded and Angle-Bar Track Joints at New Orient Mine.

	10¼ Thermit-Welded Joints:	*Material*	*Labor*	*Total*
104	Themit units	$340.08	.....	$340.08
23	sacks fireclay	17.25	.....	17.25
50	gal. kerosene	4.90	.....	4.90
21	shifts and 5 hours' welding	.....	$130.29	130.29
3	shifts preparation on surface	.....	17.00	17.00
6	shifts grinding joints	.....	36.00	36.00
	Total	$362.23	$183.29	$545.52
Cost per joint				$5.245
	10¼ Angle-Bar Joints:			
104	pairs bars	$280.49	.....	$280.49
624	bolts	18.26	.....	18.26
104	bonds	54.39	.....	54.39
22½	lb. copper rod	8.33	.....	8.33
15	shifts lining and applying bars	.....	$90.00	90.00
6	shifts bonding	.....	36.00	36.00
Power		2.44	.....	2.44
	Total	$363.91	$126.00	$489.91
Cost per joint				$4.71
Maintenance labor over life of joint (2 hours)				$1.71
Four bolts				$0.14
Total cost of joint over track life				$6.56



The turnout here shown facing oncoming trips is equipped with a signal box (left) and indicating lights (right) to show which way the switches are lined and also if they are cocked or thrown too far. With the switches lined for the curve, the red light is burning, but this red light also would burn for cocked switches.



Some of the wallboard trolley guards employed in the New Orient mine. Those in the right foreground have been put up with swinging suspensions, which permit the boards to move when struck from the side. Cost of board is 4c. per running foot, it does not splinter nor ignite easily; burns slowly when ignited.

is to clean and scale off all loose pieces of rock and apply one coat about ⅓ in. thick, allow it to set for at least 48 hours and then apply a second coat of the same thickness, making certain that the surface is completely sealed from the air. None of the guniting jobs done on the haulageways have ever needed subsequent attention and all have been done by the company staff.

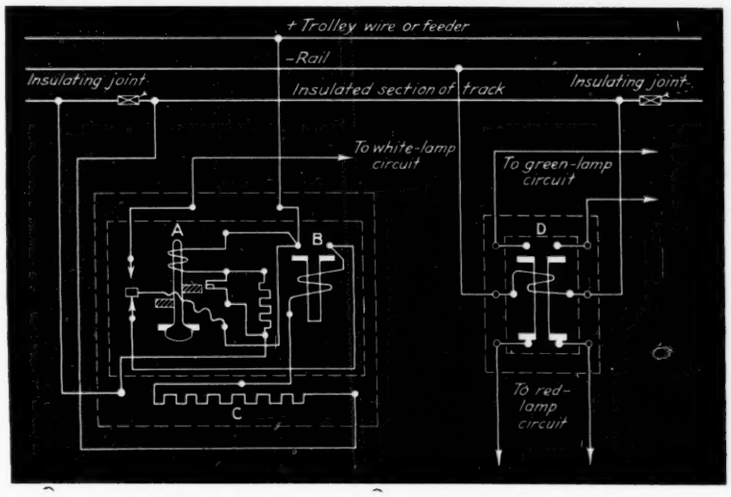
On permanent haulage roads, grades of 2 per cent against the loads are considered the maximum for good operation. To further facilitate the movement of the main-line trips, all splits of air are carried over the main lines by concrete overcasts. Doors are used only on the far inside and are controlled by the trappers in the sections. All doors are equipped with a safety-glass window to permit those approaching to see what might be on the far side.

All main-line trolley is 6/0, and 4/0 is used in the working territory. All trolley wire under which men commonly pass is guarded, and for this purpose common wallboard is used successfully. This board costs 4c. per running foot in strips 6 in. wide and 8 ft. long, is very hard to ignite and burns slowly when it does take fire, which fact was a major reason for selecting it. Moreover, it does not split or splinter if accidentally torn down, but folds out of the way without injuring anyone. It is comparatively light, so that one man may easily carry 100 linear feet, and this is another factor in favor of the maintenance cost. It is installed with a swinging suspension, permitting it to move out of the way when struck from the side.

The dispatching and signaling system at New Orient is quite thorough. All traffic is handled by a chief dispatcher at the main junction at the north end of the main bottom and he directs the movements of all main-line trips by telephone through trapper stations at strategic points throughout the mine. All these men handle the trips through hand-controlled red and green signals. Supplementing the manually controlled lights are additional automatic signals.

At all turnouts facing the trips on

Fig. 1—Wiring diagram for the signal lights showing obstructions on the track over the hills in New Orient mine.



main lines and cross entries, the practice is to install switch signal boxes with red and green, and sometimes yellow, lights to indicate the position of the switch points. The green light always indicates that the switch is lined for the straight track; red indicates that the points are cocked, or partly opened, or that the switch is lined for the curve, except that when the turn is the regular routing for a trip throwing the switch completely to the turn lights a yellow lamp. An extension on the bridle bar, operating through cams in the switch box, makes and breaks the circuits to the lights. The indicating boxes with the lights are placed so as to make them visible from a distance for the motorman on the approaching trip.

Develop Own Signal System

Automatic block signals also are used to show whether the road over a hill is clear of loose cars, standing trips, metal crossbars, etc., and also if a rail is broken. In this signal system, developed at the mine, short-circuiting of 2-12-24-volt current flowing in one section of the rail, insulated at each end by insulating rail joints, is used to actuate relays and thus change the signal lights from one color to another. The electrical circuits and equipment ("Type SL automatic signal blocks") are shown diagrammatically in Fig. 1. The equipment consists of three special direct-current relays, *A*, *B* and *D*, with Resistance *C*, as shown in the sketch. A section of one rail is insulated from the remainder of the track system with a regular railway-type insulating rail joint, the length of the insulated section varying with the individual application. Insulated sections of 1,000 to 1,500 ft. have been operated satisfactorily. Where there is very little moisture, longer track sections may be insulated if necessary.

Relays *A* and *B*, with Resistance *C*, are mounted together and should be located at one end of the track section so that they may be connected as shown in the sketch. Relay *D* is mounted separately and is located at the opposite end of the insulated-track section and is a double-throw relay controlling the red and green

Welding, as shown in this close-up, makes the rails continuous.

lamps. Red, of course, denotes STOP, while green indicates a clear block to PROCEED. If any part of the insulated section is occupied by a car, trip of cars, locomotive, or any other obstruction which would act as a conductor between the two rails of the section, or if any part of the signal system becomes defective, the red light will burn, as the coil in Relay *D* will be shorted out. The signal operates on a closed circuit, which is a safety feature in itself because there can be no cause for a false clear signal if any part should fail.

Relay *B* is used to disconnect the positive side of the line from the signal system in case of an open circuit in any part of the signal system so that track men may work on the track with safety assured.

In cases of power outages, the armatures of all the relays will open, and to reenergize the system when power is restored, a dashpot relay, *A*, is used. The closing of the armature in Relay *A* is delayed by the dashpot to permit Relay *B* to close. When the armature in Relay *A* closes, a circuit is complete to a white light, indicating that Relay *A* is operating and that its armature is closed. This latter device is a convenience for the electrician and is disregarded as a signal by any other than the electrician. The coil in Relay *D* operates on a very low voltage and permits the use of very low voltage on the track.

Glass panels in the doors enable a man to look before he opens.

All Wrecks Eliminated

The signal system, which is very sensitive, has been in use for a long time. It eliminates entirely wrecks in the swags and collisions at the junctions of main lines and cross entries. The maintenance cost of this system is very low and we are now contemplating using this device to hold the main-line trips at safe distances apart along the haulage.

In order that there may be no misunderstanding of the code of rules governing the movement of main-line locomotives at New Orient, a set of printed rules is attached to the frame of each such unit for the benefit of the motor crew. The rules read: "RED denotes STOP," "GREEN denotes PROCEED," "YELLOW denotes PROCEED WITH CAUTION" and "LIGHT NOT BURNING at fixed location denotes STOP." The latter, having the same meaning as the RED, or DANGER, signal, eliminates any chance of a misunderstanding and puts the responsibility for the movement of a trip directly up to the motorman in charge. We have found that the motormen so appreciate the safety afforded them through both the hand-actuated and the automatic safety signals that they cooperate to the fullest extent with the management to assure correct operation of these signals at all times.

SASKATCHEWAN MINE

Lifts Coal With Mobile Loader

Hoisting It in a Shaft With Bucket Elevator

Shallow shaft hoisting at the rate of 800 tons per day by bucket elevator is the arrangement in use at Western Dominion Coal Mines, Ltd., Bienfait, Sask. Mining a 10-ft. lignite seam carrying about 33 per cent moisture, the coal is undercut and sheared, shot by black powder, partly hand and mechanically loaded into 2½-ton cars which are end-dumped onto a feeder discharging into a crusher, before delivery to the bucket elevator for hoisting. All sized and screened coal is tipple-loaded into box cars for market shipments.

By R. DAWSON HALL
Engineering Editor, Coal Age

AS A MEANS of hoisting coal up an 8 x 10-ft. shaft 65 ft. deep, the Western Dominion Coal Mines, Ltd., Bienfait, Sask., uses a bucket elevator the capacity of which is 800 tons daily. With this arrangement, the only manual force needed at the top or bottom of the shaft is the dumpers at the shaft bottom. The coal is delivered to the tipple in such small units that there is not alternately a feast and a famine such as occurs when the unit is a car or a skip. As the shaft is not deep, the strain on the conveyor is not excessive.

Lignite having about 33 per cent of moisture such as is here mined dries rapidly when the thirsty air of Saskatchewan enters the mine, causing crevices to form in the coal and rendering notches in pillars unsuited for the support of crossbars. It is a maxim in the coal fields of the Province that if air is admitted to the mine, it speedily will wreck the surfaces of the pillars, but apparently no one has tried the moistening of the air to add to the moisture content, thus reducing the desiccation of the pillars, though this plan of meeting the problem has been under discussion.

Crusher Reduces Lump

Coal is brought in cars to a point near the bottom of the shaft and discharged by an end dump. Each car is pushed back to a sidetrack and allowed to run to its place in a trip after dumping. Coal thus dumped falls on an apron conveyor 24 in. wide (30 in. wide including rollers) which carries up the coal to a crusher that reduces the lumps to from 8 to 20 in., as desired. Quite frequently the maximum size is 14 in.; the coal then falls onto a small chain-flight conveyor and is delivered to the 105 buckets of the hoist conveyor which are 28 in. long, 20 in. wide and 20 in. deep. The drums have a diameter of 44 in. and revolve twelve times in a minute.

On reaching the surface, the buckets discharge the coal either onto a bar screen or directly on the shaker screen. In the summer, when no lumps are desired, the bar screens are removed and all plus 4-in. coal goes to a second Jeffrey single-roll crusher. In the winter, none of the coal is crushed in the tipple. These are, however, extreme conditions. In the intervening months, the crusher in the tipple may be set to make 4½-in. stove or 8-in. cobble. The coal goes to the screens, which are equipped with 15 ft. of plate with 2-in. round holes and beyond this with the same length of plate with 4½-in. round holes. Below the 2-in. screen is one with wire at ½-in. intervals, 15 ft. long, and 10 ft. of this length is provided with a homemade knocking device to prevent blinding, as some of the coal comes wet from the mine. To avoid freezing during the extremely cold winters, this screen will be heated by passing electric current through the wires.

Manitoba Big Customer

Whenever 14-in. lump is prepared, arrangements also are made to produce 2x6-in. cobble-stove. If lump is not being produced, the cobble-stove is made 2x7 in. or 2x8 in. The tipple also makes a 4½-in. stove and a ½x2-in. stoker. Bug dust (under ½-in.) goes to the packing house of the Swift Canadian Co., Ltd., and to Dominion Electric Power, Ltd., at Estevan. The Province of Manitoba takes 80 per cent of the product. Present limits of the market are Saskatoon, Sask.; Swift Current, Sask., and Winnipeg, Man. When this mine was visited last summer, the output was about 500 tons daily; in the winter it should reach 800 tons, but it will remain at that figure as that is the limit with the hoisting facilities provided.

All coal is loaded into box cars, the

bug dust by gravity chutes and larger sizes by three box-car loaders of a new type devised by A. C. M. Wilson, general superintendent, and manufactured by the Brown Steel Tank Co. The loader has a hinged conveyor which enters the car and places coal at either end or in the middle. This conveyor runs by electric power, but the unit is pushed in the car, lowered, raised and adjusted by the operative who supervises the filling. Lightness and flexibility are features of this equipment. Five tipple tracks are provided.

Power is purchased from the Dominion Electric Power, Ltd., at Estevan. Current is received at 13,000 volts a.c. and stepped down to 220 volts a.c. for use on the surface. In the mine, 220 volts a.c. also is used; the motor-generator set for that purpose has a capacity of 125 kw.

Underground operations are conducted in the Fort Union series, which is of Tertiary age. All the coals of North Dakota are in this same series. There are two seams present in this area, and it is the lower of the two which is being worked. Its thickness is about 10 ft.

Rooms 22 ft. wide are driven in the seam at 30-ft. centers for a distance of 250 ft. Entries block out the area in 500-ft. squares, and the rooms are driven to meet. Coal is cut by a Goodman Universal cutting and slabbing machine which will cut at any level or angle and so can undercut, overcut and shear. The coal at this mine is first undercut and then sheared. Thus cut, the coal is shot by black powder. Some of it is loaded out by a Goodman 360-A low-height track-loading machine, but in addition at present there are eleven men hand-loading.

Air enters the mine by a timbered slope and leaves by the shaft, being propelled by a Sirocco pressure fan. The company does not like to put the air into the mine near the dumping points because the air dries and thus weakens the lignite pillars, causing them to spall and making support of the roof difficult.

About 15 in. of coal is left over all openings as a roof beam. In fact, in roadways as much coal is left in the roof as can be arranged with due consideration to the necessary height of trolley wires above the rail. These are already suspended but not yet charged; for the present horses haul all coal; mules are not employed in this field. Bonding already has been completed.

Between the rooms are 8-ft. pillars which are not withdrawn. On these, there is no sign of weighting, probably because the cover is only 65 ft. thick. However, as the overlying material down to the coal is almost unconsolidated, the pillars do remarkably well. A row of props is set on each side of the main tracks with good cap pieces. Timber comes from Manitoba and is mostly tamarack.

Some water appears above the mine floor and, not being enough to handle with pumps, is removed by tanks. It is in such small volume that it could be handled by shoveling the water into the loaded cars, but this would cause the coal to blind the screens and would spoil its appearance. Entries are blocked out well in advance of operation so that the miners in the rooms will not have to contend with water.

Thus far, there have been no cases of spontaneous combustion, but the coal in this region is subject to it, and in other mines fires have occurred. Care is taken not to leave piles of fine coal alone or in company with larger coal or it will heat and catch fire. Gage of track is 42 in., and cars hold 2½ tons each. Production per man-hour runs from 0.7 to 0.8 ton, though as much as 1.23 tons has been attained. These figures are based on every man employed above and below ground, including the mine manager.

Tipple of the Western Dominion Coal Mines, Ltd., which receives coal from a bucket elevator in the mine shaft.

SCREENINGS ASH ADJUSTED

By Re-treating in Auxiliary Washer

At the New Clemens No. 22 Preparation Plant

Washing of all coal from 7-in. down is the practice at the steel-and-concrete mechanical-cleaning and screening plant at the new No. 22 mine of the Clemens Coal Co. This size first passes through a primary washer and then 1¼-in. x ½-mm. coal is screened out and run to a second washer, where the ash is adjusted (by building it up as desired) to improve the fusion temperature. Seven loading tracks and two three-compartment mixing conveyors make it possible to load seven sizes simultaneously or any desired combination. Special vibrating-screen equipment is provided for making stoker, along with special dewatering facilities and washing sprays.

WASHING to build up the ash in the screenings product rather than reduce it is an outstanding feature of the mechanical preparation plant installed with the opening of the new No. 22 strip mine of the Clemens Coal Co., near Mulberry, Kan. This operation, which started to ship coal in August, 1938, replaces an earlier property also called Mine No. 22. The Weir-Pittsburg, or Weir-Cherokee, seam, originally recovered by shaft methods, is mined at the new operation. Known as "Jayhawk PURalized" coal, the product is marketed by the Mackie-Clemens Fuel Co.

All coal from 7-in. down is washed in two stages. In the first stage, all the minus 7-in. fraction is passed through one washer, primarily to clean the larger sizes. The 1¼-in.x½-mm. screenings is then passed through a second wash box, where the ash is built up to the desired percentage, at the same time increasing the fusion temperature.

Load Seven Sizes at a Time

Two sets of classifying shakers, plus an auxiliary vibrating screen for stoker, and seven loading tracks make it possible to load seven sizes at a time, or any desired mixtures. Sizes normally loaded are: 7-in. lump, 7x3-in. furnace, 3x2-in. fancy nut, 2x1¼-in. No. 2 nut, 1¼x1- or 1¼x¾-in. chestnut, 1- or ¾-in. screenings and 1x$\frac{3}{16}$- or ¾x$\frac{3}{16}$-in. stoker. In making stoker, only half the minus 1- or ¾-in. fraction is run to the vibrator, while the minus $\frac{3}{16}$-in. may be loaded separately. Two three-compartment mixing conveyors and an auxiliary screenings conveyor provide maximum flexibility in making mixtures and screening out stoker. Five loading booms are provided for the coarse sizes.

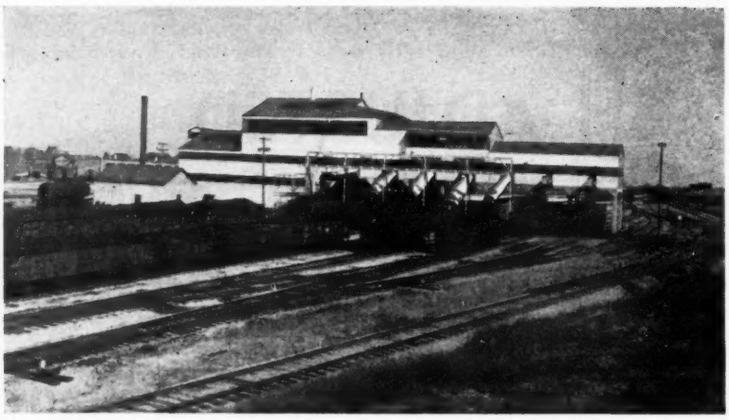
Coal over 7 in. in size is hand-picked and the pickings are crushed to recover coal values and also to supply material for tempering the screenings. Great care is taken to reduce the sludge loss by always insuring that fine coal is dewatered over unworn screens. Wedge-wire sections in the inclined runs of scraper conveyors have been found very helpful in reducing moisture in screenings by bringing in a squeezing action in addition to shaking and natural drainage. As a result, total moisture in screenings has been cut about three percentage points. All sizes produced may be dustproofed by the application of hot wax.

Reject at No. 22 runs 16 to 20 per cent, which indicates clearly the fundamental reason for the adoption of mechanical cleaning. A second reason was a high degree of uniformity in shipments from day to day. With the pyrites usually encountered, numerous horsebacks and slips in the coal, plus fireclay bottom lifted accidentally from time to time, it was felt that any attempt to rely on hand-picking and screening would result in an erratic product which would average substantially higher in impurities.

Ash Held at Uniform Level

But while washing was desirable from the standpoint of uniformity in screenings quality, it normally would mean, in the case of this particular coal, that reducing the ash down close to inherent also would reduce the fusion temperature. Consequently, it was decided to run the screenings through one wash box, where they would be partially cleaned but would serve largely to improve the efficiency of cleaning the coarse sizes, and then re-treat them in a second box to build up the ash to a uniform level, using crushed refuse from the first box. As far as possible, bony material is used in building up in the re-treating box, supplemented as necessary by shale from over the coal in the pit. For the latter reason, no cleaning at all is done after the stripping shovel, which assures plenty of shale particles of the right size for tempering.

Mine-run at the No. 22 plant, designed and built by Jeffrey, is dumped



The home of "Jayhawk PURalized" coal—No. 22 preparation plant of the Clemens Coal Co.

into a 175-ton steel hopper. Two reciprocating feeders move the coal out onto a flight conveyor mounted on a 30-deg. pitch which carries the coal up to two shaker screens. Rated capacity of the mine-run conveyor is 350 tons per hour—the same as the plant capacity. Feeder speed may be varied by the washer operator by changing the motor speed.

Width of the mine-run shakers is 7 ft. The upper unit is equipped with lip screens to take out minus 7-in. material. Plus 7-in. material goes onto the second shaker, which has 3-in. round perforated plate for taking out breakage. Part of the picking is done on this screen, the material dropping through a hole in the center into a McNally-Pittsburg single-roll crusher where it is reduced to minus 7-in. By taking out a deck plate it is possible to run all the plus 7-in. fraction, including coal, into the crusher. Usually, however, the lump goes onto the picking section of an apron-type picking table-loading boom, where the finishing touches are put on. Pickings, if necessary, are sledged down to pass a 7-in. opening.

Crushing and breaking the pickings is done for the purpose of adding them to the minus 7-in. raw coal going to No. 1 wash box, which has a capacity approximately equal to the main conveyor capacity. Thus, if all the lump is crushed, the No. 1 washer can handle the entire feed to the plant. A three-compartment Baum-type unit with three refuse elevators, the No. 1 washer is installed primarily to clean the 7x1¼-in. fraction. All of the minus 1¼-in. screenings also go into this box, where they build up a heavy bed and result in purer and more uniform coarse sizes. At the same time, the ash content of the 1¼-in. screenings fraction is cut to around 7½ per cent.

Reject from the No. 1 elevator on the box—largely big, heavy pieces—goes directly to the refuse conveyor. Reject from Nos. 2 and 3 elevators, containing bony and lighter refuse, is run into a Jeffrey Flextooth crusher, where it is reduced to minus 1¼ in. and fed into the No. 2, or secondary, wash box along with 1¼-in.x½-mm. coal from No. 1 washer. This latter size is made on the lower of two classifying and dewatering shakers, set one above the other, which separate the washed 7x0-in. coal into 7x3, 3x2, 2x1¼, 1¼-in.x½-mm. and minus ½-mm. fractions. The three coarse sizes go into a three-compartment conveyor extending across all the loading tracks and equipped with gates for dropping the various sizes on their respective booms or for making mixtures as desired.

Minus ½-mm. material and water flow into a slurry tank, where the sludge is dewatered and run to a sump from which it is pumped to a storage pond. This ½-mm. sludge contains 40 per cent ash. Clarified water from the settling tank is recirculated to the washers by an 11,000-g.p.m. Fairbanks-Morse centrifugal pump. Fresh water is added to the system at a rate of 500 g.p.m. (Goulds centrifugal) by means of sprays on the washed-coal classifying screens and the stoker vibrator. This volume is used to insure thorough rinsing of the coal and

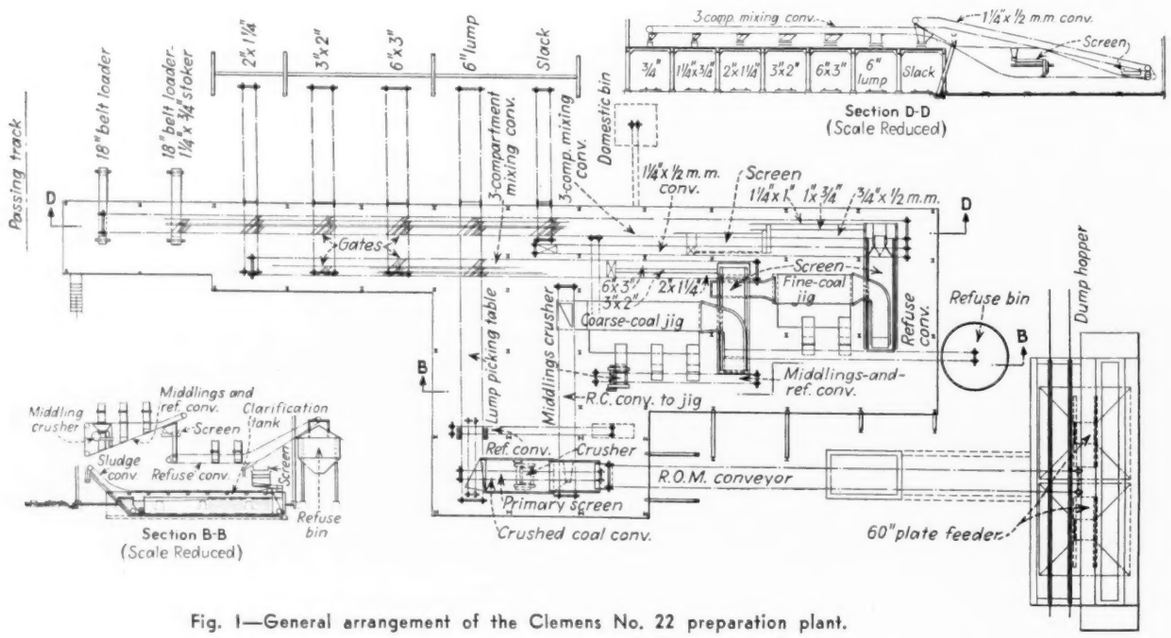
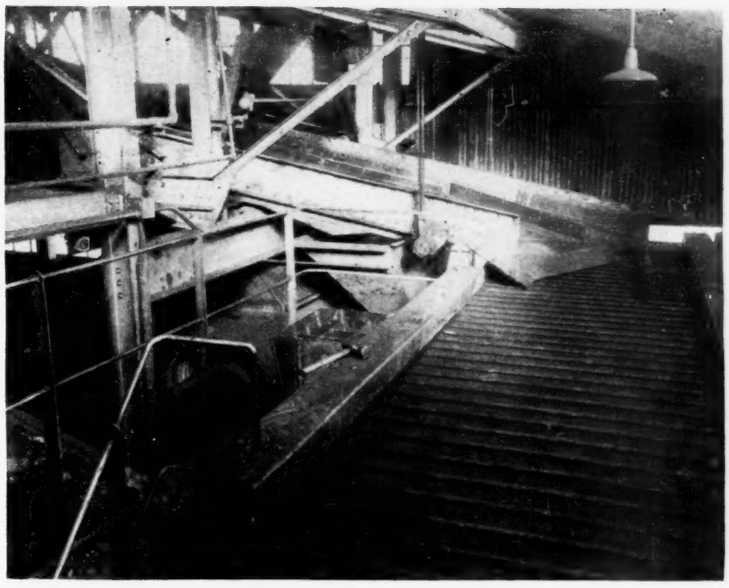


Fig. 1—General arrangement of the Clemens No. 22 preparation plant.

is considerably in excess of make-up requirements. The extra, however, is used in flushing the slurry to the sump, where it is picked up by a 200-g.p.m. Empire centrifugal pumping to the sludge pond.

The lower shaker following the primary washer originally was equipped with stainless-steel wedge wire for making the ½-mm. separation. Rapid wear and enlargement of slots was experienced, however, and consequently a number of changes have been made to reduce the oversize in the ½-mm. fraction and thus help the realization. First, instead of running the crushed reject over this wedge-wire deck, as originally was done, a separate chute was mounted on the screen to convey this product to the flume to No. 2 washer. Second, as the wedge wire wears, it is being replaced with Ton-Cap cloth, which it is believed is less expensive and less subject to rapid wear with consequent loss of coarse coal. Finally, the original ½-mm. screening deck was backed up with a separate home-made high-speed (450 r.p.m.) short-stroke shaker fitted with Ton-Cap. This auxiliary shaker makes the final separation of ½-mm. material and water, any oversize being discharged to No. 2 washer for eventual recovery on the No. 2 classifying screens.

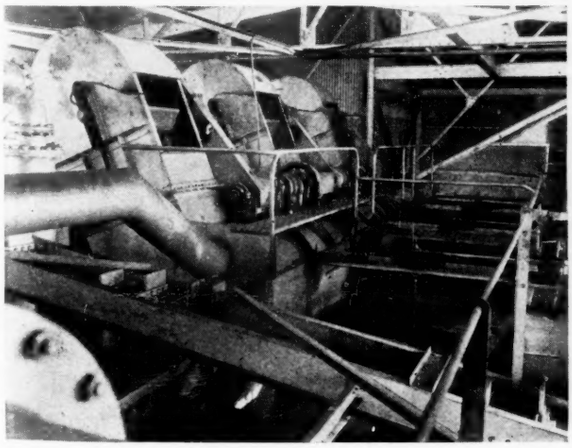
As before stated, No. 2 washer receives both washed 1¼-in.x½-mm. coal and crushed 1¼-in. secondary refuse. A third source of feed is grate bars in the bottom of the coarse-coal three-compartment conveyor, which take out water and minus ⅜-in. breakage. Also a Baum-type unit, No. 2 washer has only two compartments and two refuse elevators, as compared with three of each in the case of the primary wash box. As previously mentioned, the purpose of the No. 2 washer is to build up the ash in the 1¼-in.x½-mm. screenings, which enter with a percentage of 7½ and leave with 9½ to 10½.

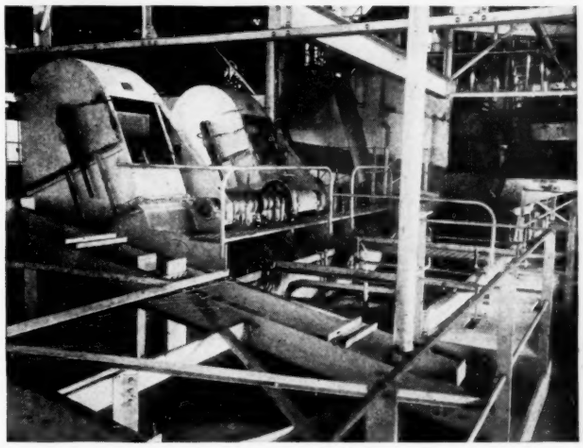


Lump is picked on both the lower shaker and this apron-type table. All other coal is washed.

The ash-building medium primarily is bony material in the coal, with shale over the coal supplying any deficiency. It is derived, as noted, from crushed secondary refuse from No. 1 washer. In the operation of No. 2 washer, the strength of the pulsations and the inflow of water are adjusted so that a rough size separation of the bony and refuse is made in the first compartment. In other words, practically all of the 1¼x⅜-in. refuse is taken out in the first compartment, leaving the minus ⅜-in. material to go over into the second compartment for building up the screenings ash. Any excess ⅜-in. refuse over that needed for tempering is removed by the No. 2 elevator. Considerable assistance in this combination of separation first by size in one compartment and second by volume in the second compartment was derived from slowing down the pulsation rate to about 25, as compared with the original of 45. In operation of the washer, it has been found that once the controls are set the unit functions accurately

Left—Primary washer at No. 22, which receives all coal under 7-in. but is designed primarily to clean plus 1¼-in. sizes. Right—Secondary washer at No. 22, where ash and fusion temperature in minus 1¼-in. coal is built up by means of crushed middlings from No. 1 washer. The dewatering and sizing screen following No. 1 washer shows in the background.





Part of the settling tank and sludge conveyor.

with little further attention. Furthermore, changing the controls to vary the ash content of the 1¼-in.x½-mm. product, when desired, is a matter of only a short time.

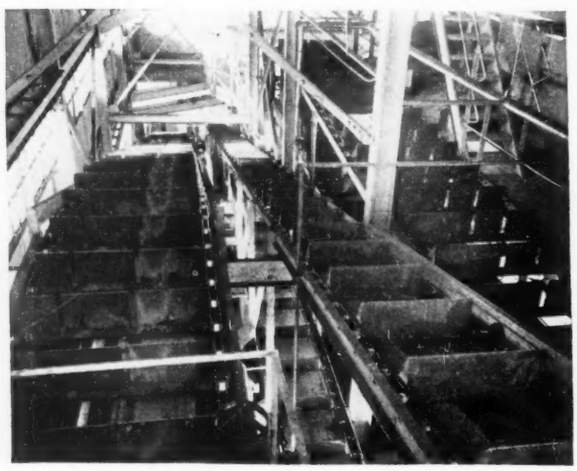
Washed 1¼-in. coal with the ash properly adjusted flows with the water onto two dewatering and classifying screens set one above the other. With two decks, the 6-ft.-wide upper shaker separates the feed into 1¼x1-, 1x¾- and minus ¾-in. sizes. The latter falls onto the second 7-ft.-wide shaker, also fitted with Ton-Cap cloth instead of wedge-wire for the reasons outlined above, where water and any remaining ½-mm. material is removed to the settling tank.

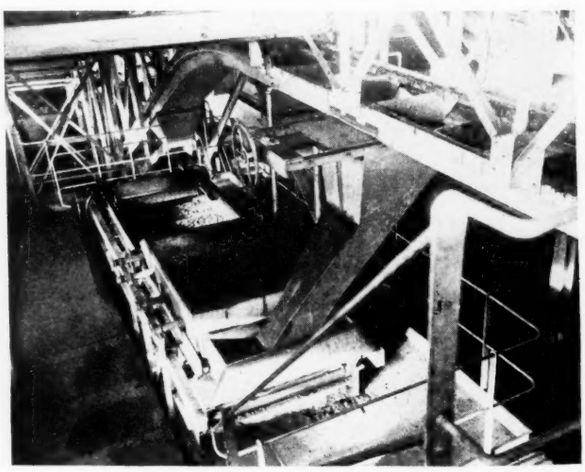
Leaving the dewatering and classifying screens, the three sizes can take either of two different routes or they may be split between the routes. In one case, the 1¼x1 and the 1x¾ go into one compartment of another three-compartment conveyor extending across all the loading tracks and with the necessary gates for dropping the coal on any desired track, while the minus ¾ goes into another compartment. In the other case, all sizes, making a 1¼-in.x½-mm. screenings, can be run into a separate screenings conveyor for transportation directly to the loading track.

This screenings conveyor also is used in splitting the dewatered and sized small coal for the purpose of making a special stoker coal. In this case, minus 1- or ¾-in. coal is dropped into the slack conveyor, with the 1¼x1 or 1¼x¾ going into its regular place in the three-compartment conveyor. And, as noted, all coal from 1¼ in. down may be run into the slack conveyor, although this seldom is done in making stoker. This slack conveyor carries the coal back to a gate which takes out approximately half for rescreening on a 4x12-ft. double-deck Symons vibrator. The rest of the coal goes on to a loading track or back into the three-compartment conveyor for mixing, etc.

The top deck of the vibrator is fitted with Ton-Cap cloth for separating the feed into 1x$\frac{3}{16}$- or ¾x$\frac{3}{16}$-in. special stoker, which goes into one compartment of the three-compartment fine-coal conveyor, where the other compartment already is carrying 1¼x1 or 1¼x¾. Minus $\frac{3}{16}$-in. material through the top vibrator deck

Left—At the left is the three-compartment distributing and mixing conveyor for fine sizes, with the corresponding conveyor for coarse coal at the right. In the center is the auxiliary screenings conveyor. Right—Stoker is made on this horizontal vibrator at No. 22. Note waxing hood on the discharge end.





falls onto wedge-wire sieves on the lower deck for further dewatering and removal of minus ½-mm. material. The ⅜-in.x½-mm. size then goes into the third conveyor compartment. With the arrangement sketched above, it is possible, of course, to continue shipping screenings while at the same time making stoker coal.

Both the slack conveyor and the three-compartment fine-coal conveyor are fitted with three wedge-wire sections each for additional dewatering, in which squeezing action plays a part. Over either conveyor, the screenings now come out with a total moisture of around 8 to 9 per cent. Before installation of the wedge wire, total moisture ran 11 to 12 per cent. With additional drainage in the cars, 1¼x ½-mm. screenings frequently reach the customer with a total moisture of around 5 per cent, at which figure the B.t.u. content, on the as-received basis, is around 12,800.

By means of hoods over the booms or the chutes leaving the three-compartment conveyors or on the end of the stoker-coal vibrator, all sizes produced may be dustproofed by the Waxolizing process, using Viking dual heating and circulating equipment.

Fresh water for spraying coal and make-up normally is derived from surface drainage into a pond. To supply deficiencies, however, a 1,000-ft. well has been drilled and equipped with a 500-g.p.m. Peerless deep-well turbine pump. Fresh water is supplied to sprays over all classifying and dewatering screens and also to the stoker vibrator by the Goulds unit noted above.

In the design of the No. 22 plant a concrete structure (reinforced columns, beams and floor slabs) was used over the loading tracks, inasmuch as the cost was about equal and the structure is neater in appearance and more substantial. Elsewhere, steel was the rule, with all walkways, galleries and the like floored with reinforced concrete slabs precast to fit. All heavy equipment, such as the washers, water-clarification plant, etc., is set on the ground or on short stub columns to reduce vibration and sway.

DUAL BUTTON-CONVEYOR DRIVE

Solved Problem of High-Friction Coal At Red Jacket Coal's Keen Mountain Mine

By J. H. EDWARDS
Associate Editor, Coal Age

And G. H. RIBLETT
Chief Engineer
Fairmont Machinery Co.

IN MOTOR DRIVES for rope-and-button conveyors a new procedure was put into use late last year at the Keen Mountain (Va.) mine of the Red Jacket Coal Corporation. This drive consists of two motors, one at each end, and this arrangement required special means of controlling torque and speeds to properly divide the load and insure that the rope should always be under tension in the top strand where it leaves the lower drive sprocket.

Coal of an unusually high coefficient of sliding friction is the reason back of the installation of the new drive. After several months of operation with a single-unit drive consisting of one 100-hp. motor at the top sheave, which amount of power, according to data accumulated over a number of years by designing engineers, should be ample for coals of ordinary character, it became evident that considerably more power would be required to assure uninterrupted service of the conveyor under all conditions and at its rated capacity of 400 tons per hour. Length of the rope-and-button conveyor, centers distance, is 1,252 ft. and the trough has a uniform pitch of 23 deg. 53 min. It carries the coal down from the headhouse to a 382-ft. belt on a 5-deg. pitch which delivers to the tipple.

In general design, the conveyor is the conventional type carrying the coal in a steel trough at the lower strand. The rope is 1¼-in. diameter, 6x19 strand, with independent wire center. Cast-iron buttons weighing 76 lb. each are clamped to it every 4 ft. Weight of rope and buttons, both strands, is 54,000 lb. and total weight of the coal in the trough at normal capacity and speed (400 t.p.h. and 125 f.p.m.) is 130,400 lb.

To obtain accurate data as to friction values for design of a more powerful drive, tests under normal operating conditions were made on rope-and-button conveyors at three mines in the district. Graphic wattmeters with chart speed at 3 in. per minute provided a detailed record of load fluctuations. Values thus obtained and the accumulated weights of coal were plotted against time at 2-minute intervals. Several checks on the conveyor line when operating without coal in the trough showed the empty load to be fairly

constant, so this friction load was deducted from the wattmeter readings before they were plotted on the graph.

From the completed graph the average weight of coal in the trough and the power necessary to move it were easily ascertained for any interval during the test. The characteristic of the coal as to apparent percentage of fine slack, medium size, large lumps and moisture had been noted at 5-minute intervals by the man checking the dumping.

Results of the various tests showed that the average friction value of the buttons on trough plates was 0.30. The minimum for coal was 0.45 with a maximum of 0.63. The two extremes for coal generally lasted for only short periods, so the mean minimum could be taken as 0.47 with 0.60 for the mean maximum. The average for coal in all the tests was 0.534. As a general rule the highest coal frictions occurred in the morning. This was especially true if the loaded mine cars had stood out in the rain overnight or over a week-end.

Because of the large amount of coal in the conveyor trough, this high coal friction, in conjunction with flatness of slope, resulted in power requirements far above any other installation of this type, with the conveyor in a single section. For this reason considerable study was given to the possible rope stresses and type of drive.

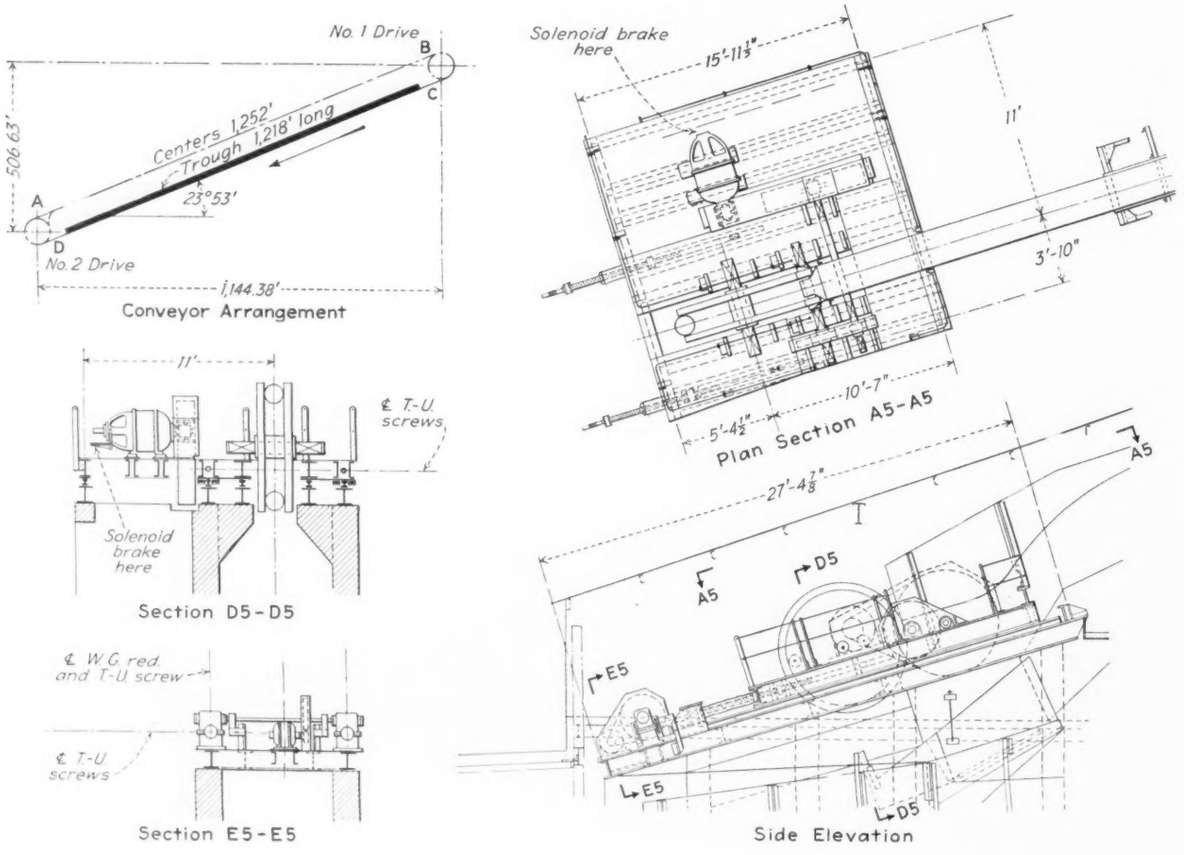
Three types of drives were investigated and final conclusions as to the merits of each were as follows:

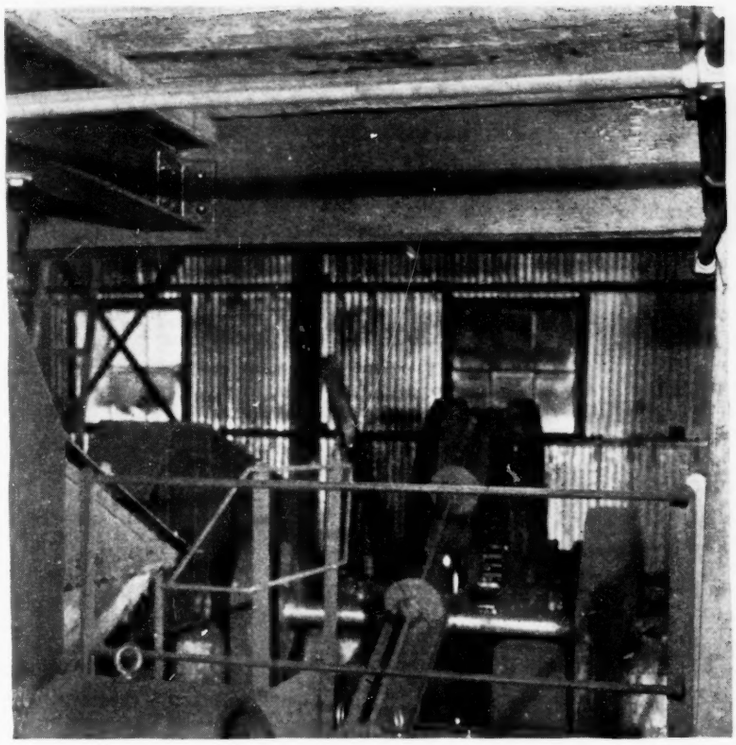
(a) *Single drive at upper end of conveyor by a 200-hp. motor:* With conveyor fully loaded the maximum calculated rope pull at "C" was zero, at "D" 19,560 lb., at "A" 19,560 lb., and at "B" 38,640 lb. Probably fluctuations in load on motor would vary from 56 to 175 hp. While this scheme was feasible in all other respects, the rope stresses were proportionally too high and the lower shaft with take-ups and supporting structure would be extra heavy to withstand the 19-ton rope pull.

(b) *Single drive at lower end of conveyor by a 200-hp. motor:* This gave calculated rope stresses of zero at "A," 19,080 lb. at "B," 19,080 lb. at "C," and 38,640 lb. at "D." This scheme had no advantage over (a) in power requirements or rope stresses and it had the disadvantage of accumulating slack rope at "A," thereby causing the heavy buttons to "ride over" in sheave pockets and kinking the rope, as shown by dotted lines. This could be very serious in case of buttons being out of gage sufficiently to bear hard against sheave tooth.

(c) *One hundred horsepower drive at each of upper and lower ends:* Assuming that the only function for the upper motor is to pull the buttons on top strand uphill and the lower motor to drag the coal and buttons in bottom strand downhill, then the maximum rope pull at "B" is 19,080 lb. and at "D" 19,560 lb. This pull at "B" would be constant and represents a load on the upper motor of 86 hp.; however, with conveyor running empty or with low-friction coal there is a maximum retarding load at "C" of 30 hp., which results in a net load at motor of only 56 hp. With high-friction coal feeding into conveyor line, this 30-hp. retarding load will be gradually reduced to zero and at the same time the load on upper motor will increase from 56 to 86 hp. At this point the rope pull at "A," "C" and "D" will be zero. As the high-friction coal continues feeding into the trough,

Fig. 1—Showing the general arrangement of the Keen Mountain rope-and-button conveyor and also how the lower drive, including motor, is supported by a movable steel frame with motor-driven position screws.





Drive sheave at upper end. The rope is 1¼ in. and the buttons weigh 76 lb. each. Use of two motors instead of one reduces calculated maximum rope stress from 38,640 lb. to 22,000 lb.

the rope pull at "D" will increase from zero to 19,560 lb., which represents a variable load on lower motor of zero to 89 hp. This scheme has the advantage of smaller rope stresses with corresponding reduction in weight of rope and buttons, hence less power consumption. The estimated installed cost of Scheme (c) was also less than either (a) or (b).

Scheme (c) was finally adopted and the electrical contractors were required to guarantee that the top rope at "A" would always be under tension, and that the maximum pull in rope would not exceed 22,000 lb. at any point, provided the combined loading on the two motors did not exceed 175 hp. Hereinafter the upper motor or control will be referred to as No. 1 and the lower units as No. 2.

In order to keep a tight rope at "A," speed and power characteristics of the two motors, and the gear ratios by which the two motors are connected to their head sheaves, must be so coordinated that the No. 2 motor tends to lag behind the No. 1 motor under all conditions of service.

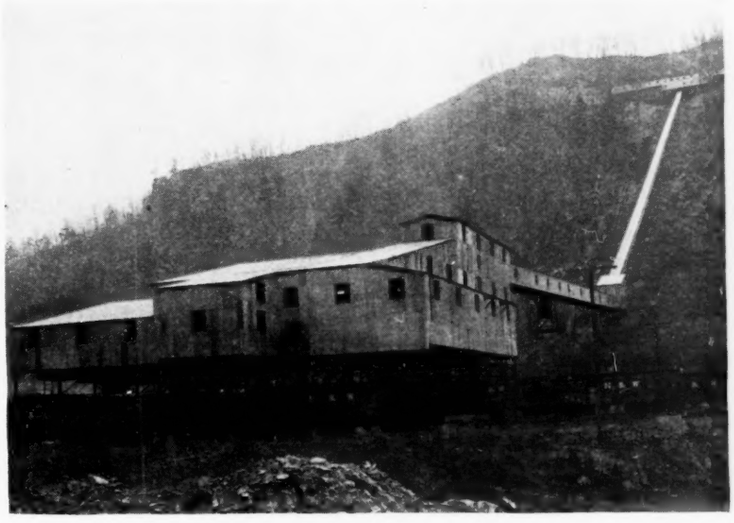
Motors are Westinghouse slip-ring Type CW, 3-phase, 60-cycle, with synchronous no-load speeds of 1,200 r.p.m. Primary current is 2,300 volts with 440 volts for secondary windings. As an additional precaution against slack rope at "A," No. 2 motor is equipped with a solenoid brake to prevent overrun of drive when shutting down conveyor line. The speed reduction ratio for No. 1 drive is 179.2 to 1 and for No. 2 drive 188.2 to 1, so to partly compensate for the tendency of No. 1 drive to overhaul No. 2 drive there is a permanent slip resistor of about 5 per cent in the secondary circuit of No. 1 motor. This combination of slip resistor and gear ratios results in No. 1 motor always exerting more torque than No. 2 motor, regardless of load conditions on the conveyor system.

This arrangement of gear ratios and slip resistance gives No. 1 motor a constant loading of 86 hp. as long as the total power requirements do not exceed this amount. With conveyor empty or with low-friction coal the difference between the 56 hp. normally required for operation and the 86 hp. as actually being developed is accounted for by No. 1 motor pulling No. 2 motor over its synchronous speed, thereby causing it to generate current back into the power lines.

Up to 95 hp. on No. 1 motor, No. 2 motor cannot assist in carrying the load, but as this point is reached a current limit relay inserts resistance in the secondary of No. 1 motor, causing the excess load to be taken by No. 2 motor. This sequence is repeated until the maximum load is being carried, at which time No. 1 motor will develop 95 hp. and No. 2 motor 80 hp. In case of a reduction in loads this sequence, of course, will be reversed.

Each motor has a control panel mounted in dust-tight cases with full-length swinging doors for easy accessibility. For interlocking the panels and operation of the pushbutton stations there are seven No. 10 gage wires paralleling the conveyor gallery. Only six of these are in operation and the seventh is for use in case of failure in one of the other wires.

The 1,252-ft. rope-and-button conveyor in the background is not a retarding unit —it requires two 100-hp. driving motors.



There is an emergency stop-button at each motor and a start-stop button in tipple-control room some 400 ft. from No. 2 motor. Both motor primary circuits are taken from a 2,300-volt line paralleling the conveyor gallery. This line feeds a bank of 2300–440 volt transformers at headhouse from which is taken the 440-volt current for motor secondaries and interlock circuits between control panels.

Control panels are Westinghouse standard Class 13–100, each containing 5-point magnetic accelerating contactors and full protection for overloads, phase failures and phase reversals. The 2,300-volt contactors are oil-immersed. Direct current at 35 to 55 volts is provided by eleven Rectox units for the various Timetactor relays. Timetactors are set to operate their corresponding contactor relays at two-second intervals. Each panel also contains an interlocking contactor that prevents closing of the 2,300-volt circuits until all time relays have been properly reset.

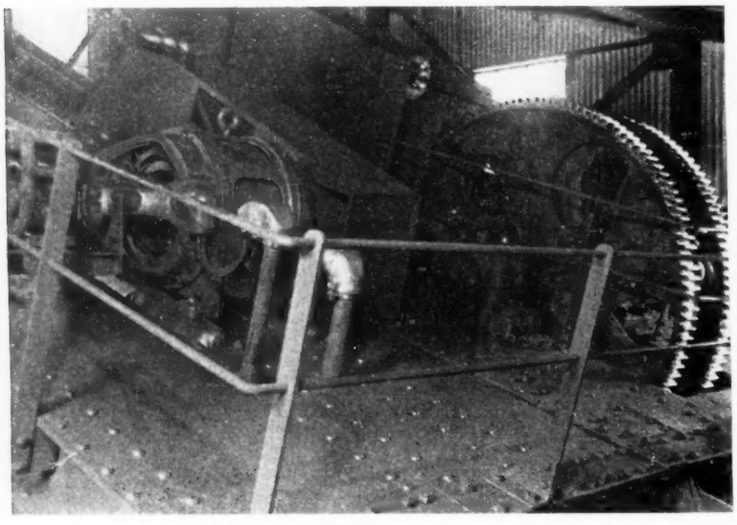
At No. 1 panel there is a master relay that feeds all a.c. and d.c. magnetic devices. The operative position is with contacts closed and they can be closed only by depressing start-button at tipple. All normally closed contacts, stop-buttons, overload relays and phase-failure and phase-reversal relays are connected through the holding contactor of this master relay, therefore opening any of these circuits will open the relay and shut down both motors.

No. 1 panel also has a current relay that is adjusted to maintain a load value on No. 1 motor of 86 to 95 hp. When the load current approaches the higher value the relay contacts are closed, which causes resistance to be inserted in the secondary circuit of No. 1 motor. This slows down No. 1 motor, thereby allowing No. 2 motor to start picking up part of the load. As No. 2 motor increases its load the load on No. 1 motor will gradually drop to about 86 hp., at which point the relay contactors will reopen and No. 1 motor will again start building up its load. This sequence of inserting and removing resistance from No. 1 motor automatically gives each motor its proper predetermined share of the load. This shifting of load is so smooth that it can hardly be detected on the wattmeter charts.

With pressing of start-button the proper contactors at No. 1 panel are immediately set on the first point of acceleration and allow No. 1 motor to develop 150 per cent starting torque, while No. 2 motor floats on the line. If this torque is sufficient to start the conveyor the rest of the accelerating relays on No. 1 motor will come in at two-second intervals until full speed has been reached. During this period No. 2 motor will not be developing any torque but will be lagging behind No. 1 motor.

If No. 1 motor has not been able to start the load, contactors will close at the end of two seconds so as to step up the torque on No. 2 motor. During the next two-second interval the torque of No. 1 motor will have dropped to 125 per cent, at which time another contactor is closed to again raise the torque to 150 per cent. If No. 1 motor still requires assistance from No. 2 motor, other contactors will be closed in order, at two-second intervals, so as to again increase the torque on No. 2 motor. This sequence will continue at two-second intervals through the balance of accelerating contacts, or until conveyor line has reached full speed, with No. 2 motor furnishing all of the starting torque in excess of 150 per cent.

The lower sheave and its drive are mounted on a movable frame topped with an inspection platform surrounded by a railing.



Average 437 T.P.H. Capacity

For 30 consecutive days after installation was completed, capacity tests were made for each of the seven-hour shifts. The average of these was 437 t.p.h., which represents a coal weight in conveyor trough of 142,500 lb. The minimum average for one shift was 431 t.p.h. and the maximum 444 t.p.h.

During six of the above days careful power tests were made by installing synchronized graphic wattmeters and voltmeters in each motor circuit. The maximum and minimum readings at No. 1 motor were 94 hp. and 86 hp., and at No. 2 motor minus 19 hp. to plus 68 hp. Although these readings were somewhat below what was anticipated this can be partly accounted for by the fact that some of the original tests were made in February and March, when the weather had some influence on the friction value of coal, whereas the final tests were made in October and November. However, the coal company now has a reserve of power which can be used for some future contingency, such as increased capacity, abnormal weather conditions or possible increase in friction value for coal.

Each head sheave is driven through a Tex-rope and two spur-gear reductions. At the upper drive both countershafts and headshaft bearings are supported by an integral concrete pier, with motor resting on structural steel beams. All of No. 2 drive, including motor, is supported by a movable structural-steel drive frame. This frame has a travel of 54 in. and acts as a take-up for rope. It slides on 80-lb. rails which in turn are supported by concrete piers. Two Acme thread screws driven through Cleveland worm-gear reducers by a single 7½-hp. motor move and then self-lock the drive frame at any desired position.

The complete design and installation was made by Fairmont Machinery Co. All of the electrical equipment was furnished by Westinghouse Electric & Manufacturing Co. and credit is due their engineers for developing a very successful system of controls and interlocks for the two motors.

RECOVER 3-FT. SEAM

With 23-Yd. Shovel at Clemens 22

Where Coal Moves in 32-Yd. Semi-Trailers

With a 3-ft. seam under cover averaging 40 ft., the Clemens Coal Co. uses a 23-cu.yd. electric shovel for stripping, a horizontal drill and gelatin for drilling and shooting the overburden, and a 4½-cu.yd. horizontal thrust loader for picking up the coal. The 23-yd. dipper replaced an 18-yd. unit, and shovel performance averages 550,000 cu.yd. per month. Shooting cost runs about ½c per cubic yard. The coal is hauled in 32-cu.yd. bottom-dumping semi-trailers which make a 4-mile round trip in about 30 minutes.

OPENED in 1938 to replace a worked-out operation, the new No. 22 strip mine of the Clemens Coal Co., near Mulberry, Kan., now recovers the 3-ft. Weir-Pittsburg seam under a maximum of 56 ft. of overburden. Shipping around 2,000 tons per day, the mine is equipped with a 23-yd. electric shovel, a 4½-yd. horizontal-thrust loader, and six 32-yd. bottom-dumping trailers pulled by 200-hp. gasoline-powered tractors. The coal is prepared and the ash in the screening adjusted (by building it up) in a complete washing and screening plant with a capacity of 350 tons of mine-run per hour. A description of this plant is the subject of an article beginning on p. 41 of this issue.

Mine No. 22 also was the designation of the old operation which the present plant replaced. In this replacement, the stripping and loading units and auxiliary equipment were moved from the old location to the new, which was laid out for tractor-trailer haulage. Consequently, the haulage units represent an addition to the original equipment. The stripping shovel, a Marion 5560 machine with 95-ft. boom and 62-ft. 9-in. dipper sticks, was purchased in 1932. In 1936, the original 18-yd. plain-steel dipper, weighing 38 tons empty and 65 tons loaded, was replaced with a 23-yd. alloy-steel dipper weighing 32½ tons empty and 67 tons loaded. The dipper is counterweighted. Maximum shovel output has been 650,000 cu.yd. per month; usually, however, the performance under present conditions is around 550,000 cu.yd. per month.

The coal at No. 22 is underlaid by fireclay. General pitch of the field is about 17 ft. per mile northwest, and the seam is regular in lie. Over the coal is about 12 to 15 ft. of blue shale up to a thin "pilot" seam, which is followed by more shale. Generally, the total thickness of the shale is 20 to 25 ft., with the rest of the bank made up of clay and surface soil. Overburden averages close to 40 ft.; the maximum which will be tackled with the present equipment is 56 ft.

Being very hard, the shale in the overburden must be shot. For this purpose, a United Iron Works horizontal drill is used. Hole size is 4 in. Depth is 65 ft., which also is the cut and pit width. In starting stripping work in 1938, holes were drilled on 65-ft. centers. Because of somewhat deeper overburden and thicker and harder rock, however, hole centers have been reduced to around 39 to 42 ft. Holes are drilled 6 ft. above seam to minimize shock to the coal in shooting and are loaded with 3x15-in. 40-per-cent gelatin. Normal loading with present centers, depth, etc., is 175 to 200 lb. per hole. Shooting cost now runs about ½c. per yard; cost for 1938 was slightly under 0.4c. per yard.

Pit length is about one mile and it is entered by three runways through the spoil—one about the center and one at each end. This makes it possible, when the stripper is past the center runway, to have the haulage units come in one runway and go out the other. This is the case most of the time, although there are short periods when the haulage equipment must turn in front of the loader and go back out the same way it came in. A slight outside curve in the pit facilitates disposal of the spoil in the deeper overburden.

The stripping shovel does its own cleaning up and is not followed even by a bulldozer, inasmuch as the material left on the coal (largely blue shale) has been found good for building up the ash in the screenings and thereby the fusion temperatures. Horsebacks and slips are frequent. Slips are loaded with the coal, while the horsebacks are picked up by the loader and deposited along the toe of the spoil bank to be worked over by hand later to salvage the coal. Shooting is required to break the coal up for the horizontal-thrust loader (a Bucyrus-Erie 75-B unit with 4½-yd. dipper). Holes are put in with a pneumatic drill supplied with air by a gasoline-powered Ingersoll-Rand compressor, and are loaded with FFF powder.

One of the six haulage units is kept as a spare; the other five make a total

Here the No. 22 stripper is working across the end of a runway.

A horizontal-thrust loader places the coal in the 32-cu.yd. semi-trailers. A typical bank appears in the background.

Haulage unit pulling up a 2-per-cent grade on the incline to the preparation plant. The cut was made with the stripping shovel.

of about 80 round trips (4 miles per trip on the average) per shift. In other words, each unit brings in a load of coal about every half hour. Haulage units comprise a 32-cu.yd. United Iron Works bottom-dumping semi-trailer (mechanically operated doors) pulled by a Dart Model 200 tractor (200-hp. Hercules gasoline engine). Rated full-load speed is 30 m.p.h. on the level. On the 2½-per-cent maximum grade encountered, the average drops to about 20 m.p.h. The five units use about 200 gal. of gasoline per shift.

Main roads at No. 22 are laid out to eliminate inclines into the pit. To accomplish this, the incline was made at the opposite end; i.e., down from the hopper. In this operation, 1,200 ft. of the main road was put on a 2½-per-cent grade. The necessary cut was made with the stripping shovel and finally ditches were shot out in the rock on each side. From this section, the rest of the main road was built on a grade of ½ per cent down onto the coal, on which it was extended the necessary distance to accommodate the farthest runway.

Roads Asphalt Seal Coated

Following excavation, the road was graded. On this subgrade a base of about 3 to 4 in. of minus 2-in. crushed sandstone and dirt was laid and treated with oil. The haulage units then were run over it three or four weeks while the subgrade was worked regularly with a maintainer. This compacting process was followed by an asphalt seal coat, on which chat was spread for a running surface. The first maintenance job on this road was carried out in the autumn of 1939 and cost $750 per mile. In the case of the runways, coal is left as a base, but irregularities are smoothed out and a good running surface is provided by a surface of about 8 in. of run-of-pit material.

Stripping and loading equipment are supplied with 4,000-volt power by pole line laterals at 1,000-ft. intervals. About the only other electrical equipment in the pit are the sidewall drill and a number of pit pumps, which are supplied by auxiliary 4,000/440-volt transformers. Most of the water which enters the pit is led by ditches along the runways, etc., to an old deep mine, through which it drains to the surface a considerable distance away. Pit pumps, therefore, handle only local accumulations and are fitted with rubber-hose suction and discharge lines.

MECHANIZATION MAN-POWER

And Output Measured by Federal Agencies

INDIVIDUAL yardsticks for measuring the man-power and productivity of mechanized mines against hand-loading operations can be found in many technical publications and government reports. But until the recent publication of the two-volume study on "Mechanization, Employment and Output per Man in Bituminous Coal-Mining," no broad-scale, coordinated history of these technological changes and their effect on the economics and labor relations of the industry was available.

This report, sponsored by WPA in cooperation with the U. S. Bureau of Mines, is one of the series embraced in the WPA research project on re-employment opportunities and recent changes in industrial techniques. Willard E. Hotchkiss, Carnegie Institute of Technology, was in general charge of this particular study, with F. G. Tryon, Charlotte K. Warner, L. N. Plein, Walter M. Dake, R. L. Anderson, J. J. Gallagher and Margaret H. Schoenfeld as co-authors. The factual information presented is drawn largely from statistics collected over the years by the Bureau of Mines.

In measuring advances and changes, final performance data are based on 1935 figures. A broad basic background for evaluating these results is provided by tracing the developments in underground and strip mining to the beginning of 1936. This background covers the high points in all phases of the mechanization movement from cutting, drilling, blasting, loading and haulage to surface preparation. Interrelation of physical conditions, technology and management is carefully detailed and emphasized. Over-all statistical studies in the report cover mechanical-loading growth in the Mississippi Valley, Rocky Mountain and Appalachian areas. How the authors have analyzed the comparative performance of mechanized and hand-loading operations also is explained.

What has happened in Illinois and Indiana, which together accounted for one-half of the mechanically loaded tonnage of the country in 1936 and for 43 per cent in 1937, may be taken as illustrative of the impact of technological change and coordinated management on productivity. Comparisons of tonnage per man-hour in mechanized and non-mechanized underground mines in Illinois, for example, show a rise from 0.634 ton in 1918 to 0.986 ton in 1935 for Group "A1" properties. This group constitutes identical mechanized mines for which records are available for the 18-year period under review. Man-hour output at "all other mines" in the State rose from 0.518 ton in 1918 to only 0.588 ton in 1935.

During this 18-year period, the Group "A1" mines in Illinois showed a reduction of 563 men in the number required to maintain an hourly capacity of 1,000 tons. The reduction for the non-mechanized group between 1918 and 1935 was 230 men. Similar data for Group "A1" and "all other mines" are given for Indiana, Wyoming, Montana, Washington, Utah, Colorado, central and western Pennsylvania, Ohio, West Virginia and Alabama. For the country as a whole, comparisons between 1918 and 1935 performance show an increase of 0.256 ton in man-hour output for Group "A1" mines and a gain of only 0.132 ton for "all other mines." A summary comparison between hand- and mechanical-loading by types of equipment is given in Table I.

Table I—Labor Output and Labor Requirements in Selected Bituminous-Coal Mines in Periods of Hand and Mechanical Loading, by Type of Loader[a]

Type of loader		No. of Mines	Tons Produced per Man-Hour: Hand-Loading Period	Tons Produced per Man-Hour: Mechanical-Loading Period	Tons Produced per Man-Hour: Percentage Increase	Number of Men Required to Maintain 1,000 Tons of Hourly Capacity: Hand-Loading Period	Number of Men Required to Maintain 1,000 Tons of Hourly Capacity: Mechanical-Loading Period	Number of Men Required to Maintain 1,000 Tons of Hourly Capacity: Percentage Decrease
Scraper loaders	[b]	5	0.396	0.695	75.5	2,525	1,439	43.0
Mobile loaders	[c]	39	.736	1.116	51.6	1,359	896	34.1
Duckbills	[d]	5	.777	0.954	22.8	1,287	1,048	18.6
Pit-car loaders	[e]	34	.698	0.833	19.3	1,433	1,200	16.3
Hand-loaded face conveyors	[f]	21	.435	0.503	15.6	2,299	1,988	13.5
Mobile loaders								
Illinois		17	.748	1.120	49.7	1,337	893	33.2
Indiana		16	.670	1.087	62.2	1,493	920	38.4
Total Illinois and Indiana		33	.728	1.111	52.6	1,374	900	34.5
Montana		3	.745	1.114	49.5	1,342	898	33.1
Wyoming		3	.885	1.209	36.6	1,130	827	26.8
Pit-car loaders								
Illinois		21	.701	0.842	20.1	1,427	1,188	16.7
Indiana		13	.685	0.787	14.9	1,460	1,271	12.9

[a] Computed from data of the U. S. Bureau of Mines. In general, mines were selected which showed that in two years or more 75 per cent or more of total production had been loaded by one type of equipment. Figures for the mechanical-loading period represent average performance of from two to four years under mechanical loading ranging from 75 to 100 per cent of total mine output. The hand-loading period covered was an average of three or four years under representative hand-loading conditions. Mines could not, of course, be included if there was no hand-loading period; i.e., mines that opened up completely mechanized or for which it was difficult to get a representative hand-loading period were omitted. Mines also were omitted that showed indications of inaccurate reporting. In order to retain the same relative weights of individual mines under both mechanical- and hand-loading conditions so as to reflect the composite change in productivity unaffected by changes in the relative magnitude of production between the two periods, the average for each mine was weighted on the basis of its relative significance (as measured by man-hours worked) during the period of mechanical loading covered.

[b] Arkansas, Oklahoma, central Pennsylvania, and Wyoming.

[c] Illinois, Indiana, Wyoming and Montana.

[d] Wyoming.

[e] Illinois and Indiana.

[f] Alabama, Arkansas, central Pennsylvania, Washington and Wyoming.

Partners in P

America's progress on land and sea and in the air flows from our underground resources

THE INDUSTRIAL PROGRESS that has placed the United States at the forefront of all nations is based on the abundance and constructive use of our varied natural resources. To the extent that ours is a "machine age," that our industry, our land, water and air transportation, our communication systems and mode of living depend on power and minerals—to this all-embracing extent America's progress has its roots in the coal and ore mines that supply the essential substance of our age.

It is natural that technical progress should become a basic part of the mining industry that furnishes the raw materials on which such progress is built. Storage battery locomotives, loading machines, and shuttle cars are three notable examples of advances in coal mining technique alone.

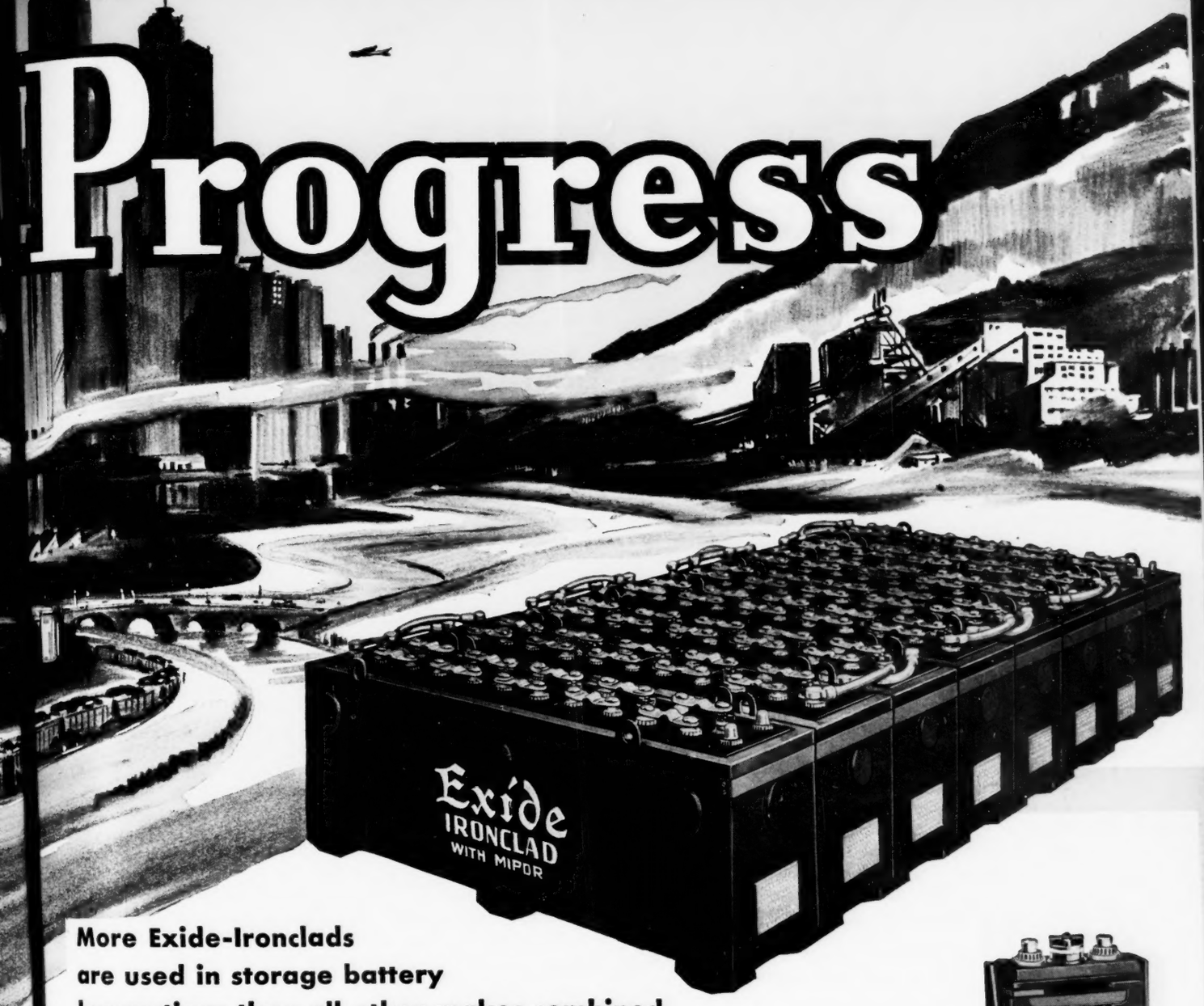
In all of these the Exide-Ironclad Battery has played a leading part. As power for locomotives, trammers and shuttle cars, it has brought new speed, higher capacity, and greater flexibility to underground haulage, not only in coal and ore mines, but in quarrying, tunneling and construction operations throughout the nation. These key industries and Exide-Ironclad Batteries are literally *partners in progress.*

Exide
IRONCLAD
BATTERIES

With Exide **MIPOR** Separators

"MIPOR," Reg. U. S. Pat. Off.

Progress



More Exide-Ironclads are used in storage battery locomotives than all other makes combined

The overwhelming preference for Exide-Ironclad Batteries follows naturally from the performance of these batteries, from their dependability, endurance and economy in actual mining operations. Their high power ability which makes easy work of heavy loads and steep grades, their sustained voltage which insures good haulage speeds all day long, and their long, trouble-free life, have made them first choice among batteries for underground haulage service.

There are three important reasons why Exide-Ironclads are outstanding. First is the company that makes them—the world's largest manufacturers of storage batteries for every purpose—a company that has spent more than fifty years building storage batteries exclusively and building them constantly better. This company knows there is only one way a battery like Exide-Ironclad can be built, and that is to have these long years of experience.

Next are the exacting standards that Exide imposes on every material and operation used in building Exide Batteries. Many raw materials, for instance, are examined by means of the spectroscope and microscope so that no trace of any damaging impurity in Exide-Ironclads can rob users of the full measure of service and performance designed into these batteries.

Third is the exclusive Exide-Ironclad positive-plate construction, in which slotted rubber tubes retain the active material while exposing it freely to the electrolyte. This construction makes the battery more rugged, longer lived, more trouble-free, and helps to make possible its tremendous, dependable power.

In your own operation, whether it is coal or ore mining, quarrying or tunneling, you will find that Exide-Ironclads will speed up your haulage service at a saving.

Cut-away cell of an Exide-Ironclad Battery, showing its unique positive-plate construction. One of the Exide "Mipor" separators is also shown between the negative and positive plates in front.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

PITTSTON NO. 9 BREAKER

Built on Modern Lines in Record Time

Gives Accurate Cleaning of 4,500 Tons Daily

By R. DAWSON HALL
Engineering Editor, Coal Age

WHEN No. 9 colliery of the Pittston Co., at Hughestown near Pittston, Pa., was leased to the Anthracite Coal Co. the latter decided to introduce more modern methods than had been used hitherto in the cleaning of the coal from that colliery. The old breaker had been torn down for many years and the coal from No. 9 colliery cleaned at No. 1, so a new breaker had to be erected, and the location selected for it was that of the old breaker. Incidentally, it may be added, to clear the record, that with the dissolution of the Pittston Co. the lease of the Anthracite Coal Co. automatically reverted to one held by the Pennsylvania Coal Co., the owner of the property.

To handle the tonnage, it was necessary to install seven cleaning units; hence, it was decided to wash, in general, only one size of coal in each unit; in this way, each size would be cleaned to suit the needs of the market and the work would be done with a minimum waste of good coal. All types of washers give their maximum efficiencies when applied to the cleaning of a narrow range of sizes, and the narrower the range the better the job.

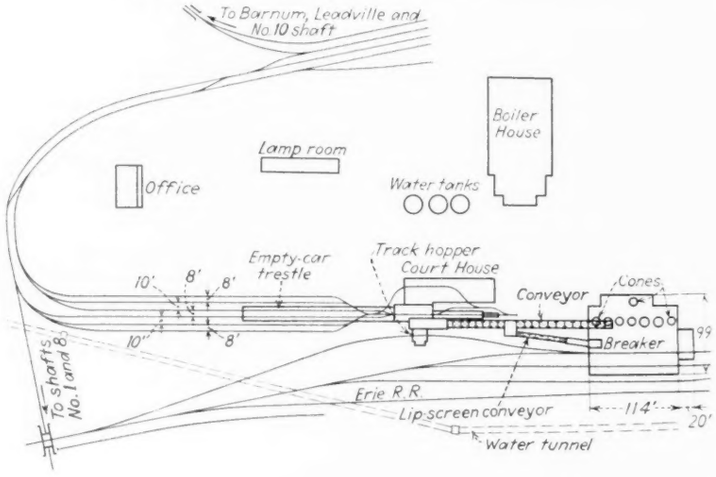
Units Can Combine Sizes

To save first cost in installation, combining of sizes may be advisable in a small breaker having a capacity requiring only a few cleaning units, but if a number of units have to be installed in any event, and if the middlings of each size do not have to be recirculated, there is no reason why any of the units should be made to handle a combination of sizes. In some cases, when a big breaker was built, it was arranged that several units would be devoted each to cleaning the same range of sizes, but later, as enough units were available to handle each size separately, changes have been made accordingly. Such revision in practice has improved preparation and reduced operating cost. When several sizes are cleaned in one unit, the larger sizes usually are cleaned to a lower ash content than the smaller, which rarely is desirable.

Moreover, when ash-percentage specifications are changed on any one size, the conditions of the unit for washing that size can be modified so as to get the grade of coal sought, for the effect on the other sizes in the cone does not have to be considered. But these considerations cannot be carried too far. Washing only a single size in each separate unit may not be desirable if some size is present in unusual percentage or in a percentage normally not in accord with the capacity provided for that specific size.

However, if it be found at any time that any cleaning unit can handle more coal of any particular size than it is receiving, it is arranged at No. 9 breaker so that a certain proportion of the coal of the next smaller size can be diverted to it so as to furnish a suitable load to the under-

Fig. 1—Plan of tracks at No. 9 breaker, Hughestown, Pa. Cars are pushed into breaker, pulled to the main tracks and then pushed to shafts. Every facility is provided for switching cars to facilitate blending.



Exterior of No. 9 breaker. On left is the conveyorway and not quite half way up is a small tower where raw coal can be fed into railroad cars for temporary stocking if breaker is idle and where coal for rewashing is fed into main conveyor. The conveyorway at right is for transportation of refuse.

loaded unit. Provided the sizing screen of the unit is changed to screen the next larger size to the size for which the cleaning unit is provided, that next larger size can be diverted to it just as satisfactorily as to the next smaller size.

Rock jigs have been used universally for reclaiming refuse from the primary cleaning units regardless of the type of cleaning units installed, but the owners of No. 9 breaker decided to try the use of a Menzies cone for such rewashing purposes. Frankly, they questioned whether the change would be for the better, but experience has more than justified the experiment; the cone gives a better result than such recleaning units commonly achieve.

Another innovation was the incorporation of an unusually big water-recovery tank at about the level of the cone and under the sizing shakers: 110 ft. long, the full width of the breaker, 15 ft. wide and carrying 9 ft. of water. All the spray water used on the sizing screens to remove degradation from the coal when it leaves the cones is saved in this 80,000-gal. tank. This water usually is wasted, but in this installation it constitutes the sole source of make-up water. This big tank enables the pumps to start the cones in operation without any delay.

A small breaker and a reduced labor force were other important advantages over the earlier installations. Opportunity to provide for the cleaning by day of coal mined and transported during the night was another objective, as also to provide an approach to the breaker that would eliminate delays in the feeding of coal.

The blending of the coal by regulation of the dumping of mine cars also was kept in mind, for thereby not only is the operation of the breaker made more regular and efficient but the product is rendered more uniform. Duplicate facilities above the cleaning units make it possible to get at least half production from the breaker in case of injury to a raw-coal screen or to a raw-coal crusher. Even if a cleaning unit should fail, the sizes can be shifted so as to maintain the tonnage at full capacity, so great is the flexibility of design.

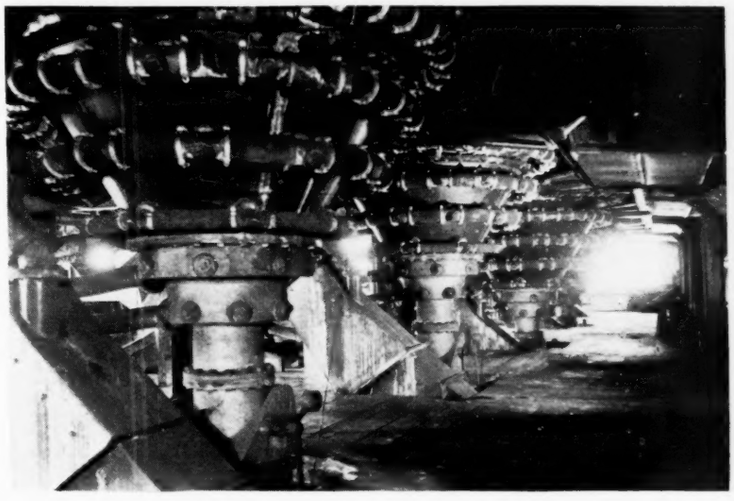
Coal comes to No. 9 breaker from Shafts Nos. 1, 8 and 10, also from the Barnum and Leadville shafts, all by tracks of 28-in. gage. Some coal also comes by auto truck from strippings. The breaker lies roughly east and west, and the mine-car tracks approach it from the west end. Barnum, Leadville and No. 10 mines, which lie to the northwest, deliver their coal about 300 ft. to the north of the center line of the breaker on one of two tracks by which the breaker is paralleled. The tracks in earlier days traveled on around a quarter circle to a "tipple," where the coal was dumped for transfer to the breaker.

Locomotives fill the tracks with these Barnum, Leadville and No. 10 cars and then push them along a track parallel to the first, which, further along, runs around a half-circle curve to the west of the breaker. Here switches are provided to two loaded tracks and one empty track. On one of these loaded tracks the cars from some one source travel until they are sufficiently advanced to reach a "car feeder" which propels the cars one by one to a rotary-dump feeder. This latter feeder also receives and handles the coal from Nos. 1 and 8 shafts.

As the cars have been pushed, not pulled, into the breaker, the locomotive can travel up the empty track and get at once to the trip of empties, which it can pull around the semicircular track to the straight track. By reversing the direction of travel of the trip the cars are pushed to the shaft. There is, therefore, no delay on the surface.

Shafts Nos. 1 and 8 lie to the southwest of the breaker, and the coal from them is delivered to a semicircular track outside the half-circle track already described. On this road the facilities provided duplicate those afforded on the tracks which receive the coal from the Barnum, Leadville and No. 10 mines. The coal cars are delivered to a car feeder on one of the two loaded tracks and thence to the rotary-

Exterior of four of the cones seen from floor below with manifolds for admitting water. Alongside each cone is refuse conveyor.



dump feeder and rotary dump already described. Coal from the several mines can be delivered to any of the four several loaded tracks by switches and can be taken for dumping in any volume or order desired. Thus the coal delivered to the breaker can be blended, assuring a more uniform product than is possible without such blending.

Just short of the switches leading to the rotary dump a switch has been laid to the "courthouse" where coal adjudged to be unduly mixed with rock is picked and the quantity of impurity present definitely ascertained. Coal from the rotary dump passes to the main chain-flight conveyor, which operates on a 6-in-12 inclination and which is 300 ft. long with 12x48-in. flights at 36-in. centers. Into the main conveyor pit, raw run-of-mine coal from railroad cars and raw strip coal from trucks are dumped and pass up to the breaker with the coal from the rotary dump.

Provision is made so that, a short distance up the main conveyor, coal from the mine may be diverted by a fly-chute to railroad cars, so that, when the mine works more shifts than the breaker or the breaker is temporarily out of commission, the flow of coal from the mine can continue unchecked and the coal can be delivered later to the breaker from railroad cars when the breaker resumes operation. It is the intention to run the mine three shifts daily and the breaker only a single shift.

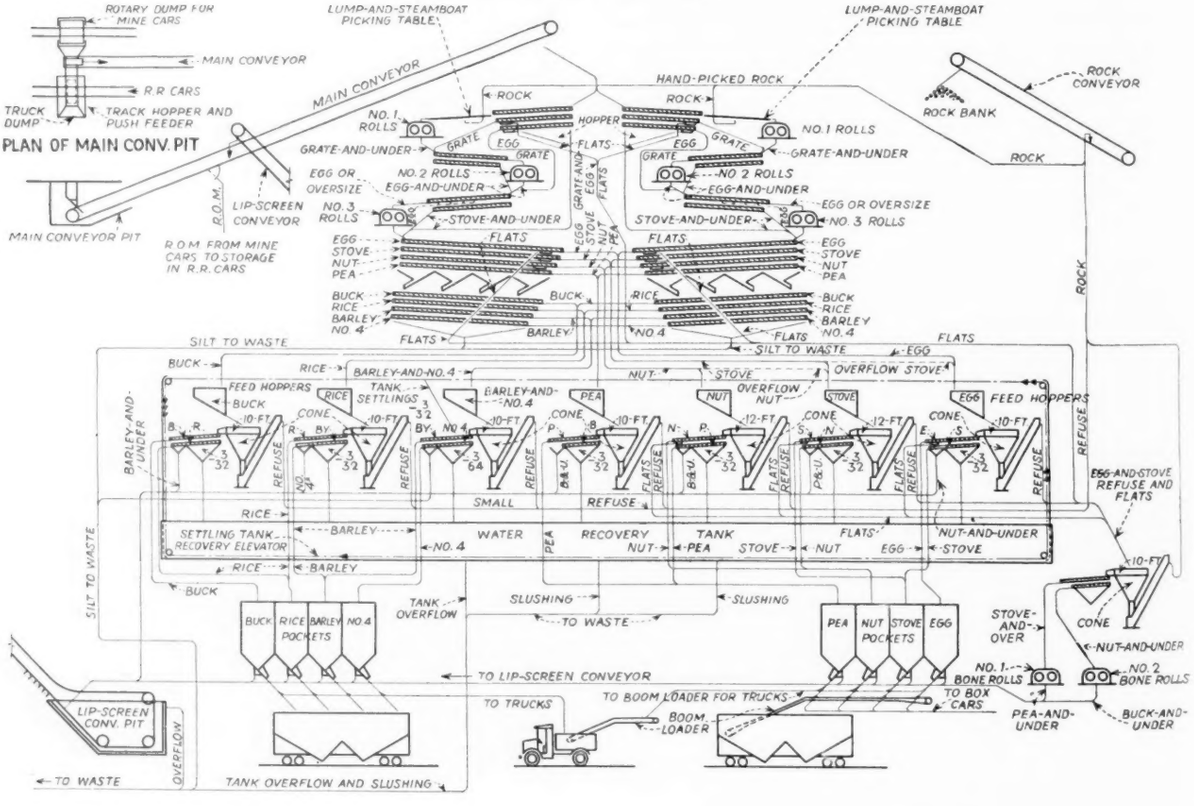
From the main conveyor to the cleaning units the breaker is in duplicate, but for simplicity everything will be described as if only one unit instead of two were present. Coal from the main conveyor passes to the bull shakers, where four sizes are made: (1) lump-and-steamboat, (2) grate, (3) egg and (4) stove-and-under. Lump-and-steamboat is passed to a 5x16-ft. picking table which is flat except for dished edges. The rock is removed by picking, not by rakes, from the table, and passes to a 10x24-in. chain-flight conveyor to the top of the rock dump.

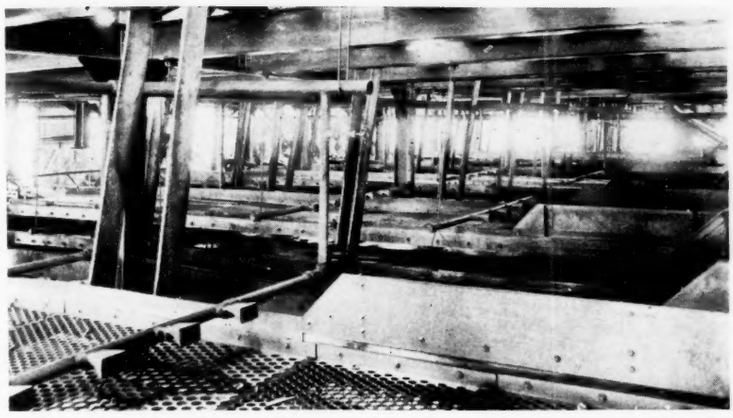
With this preliminary cleaning process, the lump-and-steamboat passes to No. 1 rolls, where it is broken to grate-and-under. Here it mixes with the grate coal from the bull shaker, and the two go together to screens where grate and egg-and-under sizes are made. The grate coal goes to No. 2 rolls for reduction to egg-and-under, which, in turn, combines with the egg from the bull shaker and the egg-and-under from the grate screen and passes with them to the egg screen and thence to No. 3 rolls, where the coal is reduced to stove-and-under. As, however, there is at times a demand for egg coal, provision is made at the lower end of this screen for passing egg, if desired, through the screen, thus bypassing No. 3 rolls.

Unusual, but not in any sense unique, is the use, in the bull shaker, of a flat-coal picker at the ends of both the grate and egg screens. It has been found desirable to remove flats as soon as possible in the cleaning process before they are broken by the rolls, though, as will be noted, they also are removed later.

These flats are received in a small cross chute below each of the screens which separate them and are joined together later where they pass to the bone cone. However, some of this flat coal is desirable, and a man is stationed at this point to select it and drop it on the grate screen loading to No. 2 rolls, but by far the larger proportion goes direct to the refuse cone.

Fig. 2—Flowsheet of preparation plant at No. 9 breaker, Anthracite Coal Co. As almost enough cones are needed to give each size a cone, each size is washed separately, except that barley is cleaned with No. 4 buckwheat. An elevated settling tank lessens pump lift materially.





Screens for removing undersize after cleaning in cones. Flexible wood arms support screens.

All the coal now is stove-and-under, unless egg is to be marketed. Some of the stove-and-under comes from a hopper below the bull shaker, some from the egg shaker and some from No. 3 rolls. It is then classified on screens into egg, stove, nut, pea, buckwheat, rice and barley-and-under. At the lower end of the egg, stove and nut screens provision is made for removal to the refuse cone of flat material, using the same device as already has been described. Stove and nut usually go through feed hoppers to two separate 12-ft. Menzies cones, and egg, pea, barley-and-under, rice and buckwheat through suitable feed hoppers to five separate 10-ft. cones of the same type. However, if egg is not being made, there will be more stove coal and some of it will go to the egg cone, and if any one size does not satisfy the capacity of any cone, coal from an adjacent cone making the next smaller size will be diverted to it. Thus, flexibility is assured.

Every cone has its own sizing shakers: (1) freeing its own size from undersize and (2) making the next smaller size, both of which pass direct to their pockets. Degradation material goes back to the lip-screen pit and thence to the breaker for classification and recleaning. Any minus 3/32-in. coal or minus 3/64-in. coal which is taken out in the dewatering process falls in the water-recovery tank. These minus 3/32-in. tank settlings are reclaimed by an elevator and go direct to the barley-and-under sizing shaker for resizing. This material is chippings from the larger sizes which have been cleaned in the cones. The silt below 3/64-in. is run to waste.

A provision for removing flats is incorporated in the egg sizing screen of the egg cone, as also in the stove sizing screen of the stove cone and the nut sizing screen of the nut cone. These flats go to the refuse cone. Refuse from all the cones, except those for egg and stove, goes to the rock conveyor. Egg coal has one 110-ton bin; stove, one of 135 tons and two of 160 tons; nut, three of 160 tons; pea, one of 160 tons and one of 110 tons; No. 4, one of 110 tons; barley, one of 135 tons; rice, one of 135 tons; and buckwheat, one of 110 and one of 135 tons.

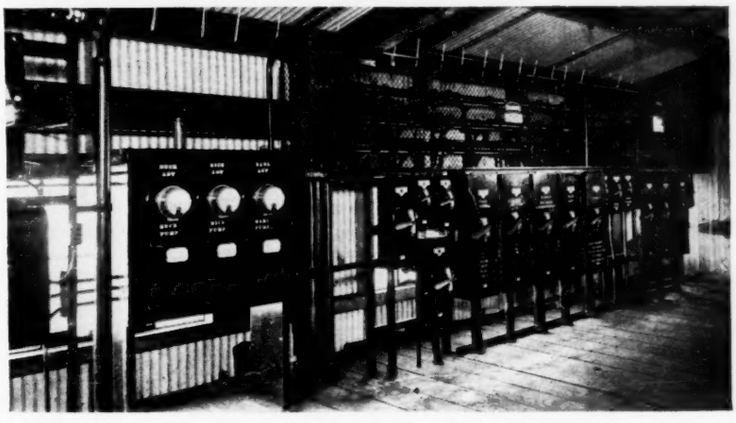
Egg and stove refuse and flats go to a 10-ft. Menzies cone, where the cleaner of this material is saved and the rock sent to the rock conveyor. The stove-and-over is sent to No. 1 rolls to be converted to pea-and-under; and the nut-and-under, to No. 2 bone rolls to be converted to buckwheat-and-under. These join the lip screenings from the pockets and pass to the lip-screen conveyor pit, where they are lifted by a 10x20-in. chain-flight conveyor, on a 7½-in-12 inclination with flights 18 in. apart, to the main conveyor, where they are delivered to the breaker with coal from the mine to receive as careful preparation as if fresh from the workings.

A 42-in. belt loader delivers coal from the pea, nut, stove and egg pockets to railroad cars, and gravity chutes carry the coal from the buckwheat, rice, barley and No. 4 pockets. A 30-in. belt loader delivers to trucks coal ranging from pea to egg. Trucks are loaded with finer sizes through gravity chutes. Box cars are loaded from the chutes by gravity.

About 5,000 gal. of mine water per minute from the Leadville shaft is used as make-up water. This water is treated with lime within the mine before pumping. For the eight cones the following double-suction volute pumps are in operation: three 18-in. units each of 13,300 g.p.m. and 125-hp., one 18-in. unit of 10,600 g.p.m. and 100-hp., one 14-in. unit of 9,000 g.p.m. and 100-hp., one 14-in. unit of 8,000 g.p.m. and 75-hp. and two 14-in. units of 6,400 g.p.m. each and 60-hp. Underground, a 12-in. 2-stage double-suction volute all-bronze unit delivers against a 488-ft. head 4,000 g.p.m. requiring 600-hp. All these pumps were made by Barrett, Haentjens & Co.

Power is fed to the breaker by a 23,500-volt 3-phase 60-cycle line through a bank of three 833-kva. 23,500/480-volt single-phase transformers. The 480-volt bus is constructed of three 2½-in. copper pipes and Burndy connectors. The main bus in the breaker is constructed similarly, and the two buses are connected by nine 1,000,000-circ.mil all-

Part of main switchboard. No oil switches and no fuses are used in the breaker. The cone runner can watch his ammeter and if the amperage of the pump of any cone rises, he knows that cone is overloaded and he can reduce or divert the feed, but he also watches the quality of refuse and of coal.



rubber cables with a 35-per-cent rubber insulation having an unbraided outer covering of 60-per-cent rubber. These cables are incased in 5-in. underground conduits. All circuits are protected by De-ion circuit breakers in dust-resisting cabinets, and all entrances to the cabinets are sealed with compound. The lighting circuits are protected with similar circuit breakers, so that actually not a fuse or oil switch can be found in the layout.

All motors are open-type ball-bearing units with dust covers over the top half of the bearing brackets, with the exception of the 24 motors for the cones, which are splashproof units with ball bearings. Both line-starters and wound-rotor motor starters are magnetic. The only line-start motors are those on the cone pumps and cone refuse conveyors.

The plant was designed by Repp & Menzies, and the cones were constructed by the Finch Manufacturing Co. Excavation for the breaker was started Oct. 24, 1938. On Jan. 22 of last year, the breaker cleaned and delivered to pockets 1,000 tons of coal, but some coal was run through the cleaning equipment as early as Jan. 19. On Jan. 23 the breaker received and delivered to railroad cars about 3,000 tons. The time required for erection was 85 working days. Average production at present date per day of seven hours is 4,500 tons. Louis Pagnotti is president; James Tedesco, vice-president; Samuel Barron, general manager; Joseph Mayers, general superintendent; Phillip Pettinato, general construction superintendent; O. E. Kenworthy, consulting electrical engineer; Stanley Rickert, colliery electrician, and Richard Mangan, construction electrician.

NEW HOISTING SHAFT

Cuts Cost of Disposing of Mine Rock And Improves Vesta Ventilation Efficiency

A SUBSTANTIAL decrease in the cost of wasting mine rock plus a considerable saving in power for ventilation have been the major results of sinking a new 513-ft. shaft at the Vesta No. 4 mine of The Vesta Coal Co., California, Pa., a subsidiary of the Jones & Laughlin Steel Corporation. The new shaft, equipped with the necessary headframe, 600-hp. electric hoist and rock-storage bins, eventually will serve the neighboring Vesta No. 5 operation, where handling mine rock has become an acute problem. When No. 5 material is cut over, the shaft will be operated two shifts.

Vesta No. 4 mine dumps 8,000 to 8,500 tons of coal per day. The tipple is on the Monongahela River and the present workings are, for the most part, some nine miles to the west, about under the towns of Clover Hill, Centerville and Beallsville. In fact, the new air-and-refuse shaft, also available for hoisting men, is almost exactly ten miles nearly due west of the tipple.

By IVAN A. GIVEN
Associate Editor, Coal Age

Main haulage at No. 4 is conducted in two stages. One stage is a head-and-tail rope system from the tipple two miles to the eastward end of the main, or Beallsville, entry. Between this point and 10 Face sidetrack, a distance of five miles, cars are handled in trips of 125 each (cars, 6,000 lb.; coal, 7,100 lb.) by three tandem locomotives. Each such tandem unit consists of two electric locomotives rated at 20 tons but actually weighing 25 tons. Each locomotive in a tandem unit is equipped with two 125- or 150-hp. motors and the units are arranged for either air or dynamic braking. While these locomotive units can make a 10-mile round trip in 52 minutes, the usual running time is about 60, which means that three 125-car trips are delivered to the tipple every hour. Grade conditions making it difficult to hold trips of this size were responsible for rope haulage on the last 2 miles to the outside.

Main-line track is laid with 90-lb. steel. Separate tracks for empty and loaded trips are the rule, but in some places conditions made it necessary to cut down to one track. This was another reason for dispatcher control, which is supplemented by a complete electric block-signal system. The 6/0 trolley wire on the main line is paralleled by a 1,000,000-circ.mil feeder which is divided into three sections, each with its own 2,000-amp. automatic-reclosing circuit breaker. In case of an outage, these breakers are set to reclose in time sequence so that first one section and then the next is energized. Thus, it is impossible as a rule for more than one locomotive unit to come back on the line at the same time.

The Pittsburgh seam, averaging 6 ft. in thickness, is mined at No. 4, and is taken completely except for about 4 in. left in the bottom. Over the seam, as a rule, is about 12 in. of drawslate, usually followed by 12 in. of roof coal

and various other types of material up to the solid top, about 4 to 6 ft., in most cases, above the main seam. Mining is based on taking down the drawslate to the roof coal in all places. Pillars, in the form of blocks, are recovered by pocketing through them from two sides, leaving thin fenders against the gob, although some open-ending is done. Breaks in the top coal and overlying strata often occur up to the solid in pillar work, another source of mine refuse, in addition to grading in haulageways, falls and the like. In solid work, practically everything that comes down must be loaded out. In pillar work, on the other hand, there usually is some opportunity of gobbing in the place, but, even so, material must be sent to the top.

The principal sources of mine refuse, therefore, are drawslate taken down for safety in solid work, breaks in pillar sections, accidental falls on haulage roads and grading. On an average day, 300 cars of slate and rock must be brought to the outside. These cars are segregated during the working shift on special sidetracks. Before the sinking of the new shaft, the cars then were brought to the outside by locomotives, where they were dumped and the rock disposed of in the bottom land along the Monongahela River by one or two 15-ton larries. The long haul to the outside (8 to 10 miles for most of the material) naturally was hard on equipment in addition to running up a substantial bill for power, labor, etc. With the new shaft, the distance the mine refuse must be moved for some fifteen years will not be more than four or five miles and at present the haul ranges from ½ to 4.

Question: How to find a cheaper way of bringing mine rock to the surface at Vesta No. 4 and a more convenient method of wasting it when it arrived above ground.

Answer: A new 513-ft. shaft complete with 600-hp. electric hoist and 240-ton storage bin with double gates for loading trucks or larries.

Results: A substantial reduction in cost of handling mine rock and a material saving in power for ventilation. Eventually, the new shaft will perform the same disposal duties for the neighboring Vesta No. 5 mine.

Completion of a new entry north from Vesta No. 5 mine in the near future will permit mine rock from that operation to be brought to the new shaft in No. 4. Little reduction in the haul for No. 5 material will result—possibly a mile for the time being—but the present uphill pull 5 miles to the No. 5 opening will be eliminated. And once outside, under the present system, mine-rock cars at No. 5 must be hoisted to the top of a hill and the slate dumped into a larry for final disposal—a difficult and fairly costly operation. Thus, routing No. 5 mine rock to the No. 4 shaft is expected to show a substantial saving in addition to that made at No. 4.

Until the new shaft, known as Nickeson, was sunk at Vesta No. 4, the operation was ventilated by three fans: one 9-ft. single-stage Aerovane at the "Fourth Hill" pit mouth, ventilating largely the eastern end of the operation; one 10-ft. double-stage Aerovane at the Clover Hill shaft, ventilating the north side of the main active workings; and one 5½ x 14-ft. centrifugal fan at Ritchey shaft, ventilating the south and west sides of the mine. Sinking of the new shaft made little change in the ventilating situation except at Ritchey shaft, which started getting air from Nickeson on Feb. 16, 1938, the volume increasing until it now is around 150,000 c.f.m.

The Ritchey fan originally was fitted with a 450-hp. motor drawing 370 hp. in moving around 285,000 to 290,000 c.f.m. at a water-gage of about 4½ in. At present, in addition to 150,000 c.f.m. from Nickeson, the Ritchey fan also handles air taken in through the downcast compartment of the Ritchey shaft, air from main pit mouth, which comes in along the main entry, etc. With Nickeson providing a one-direction flow for nearly half the air, and with about a 25 per cent reduction in average travel for this air, the Ritchey fan now handles 325,000 to 330,000 c.f.m. at a water gage of 3.7 in. Naturally, power consumption for the Ritchey fan motor has shown a corresponding decrease. Eventually, a fan will be installed at Nickeson to take care of the advancement in workings.

Nickeson shaft is the fourth to be sunk at Vesta No. 4. Of all the others, only Ritchey was equipped with a hoist (one counterbalanced cage) and was and is used only for men and supplies. Nickeson was put down about ½ mile south of the town of Beallsville at a point on top of a ridge so that the maximum quantity of rock could be dumped out across the near-

The Nickeson shaft disposal plant includes a storage bin with two undercut gates. At the right is the hoist and power house. The dumping ground is behind the headframe and hoist house.

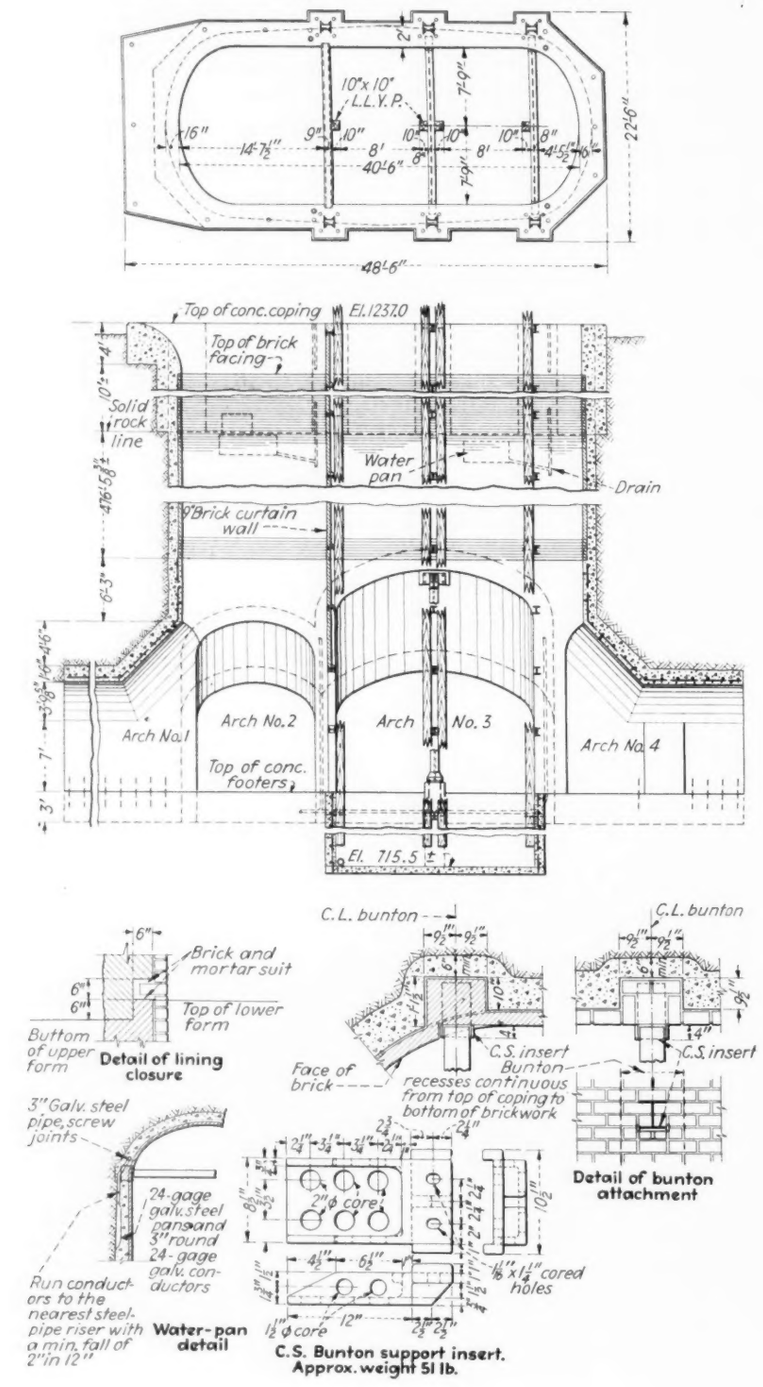
The bottom at Nickeson shaft is protected by steel crossbars set on pipe legs with welded-on bearing plates. Lagging consists of a 12-in. steel "Junior I-beam" building section.

by valleys and ravines. Depth of the shaft is 513 ft. from the coping to the bottom of the coal. Including an 8-ft.-deep sump, total shaft depth is 521 ft. Shaft size is 40½x15½ ft. inside the lining and the ends are rounded to better resist side pressure. Except for about 12 ft. of surface soil and clay at the top, the entire shaft was sunk through sandstones, limestones, shales, etc., cutting on its way down the Little Waynesburg, Waynesburg and Sewickley coal seams.

Sinking was started July 16, 1937, and, working three eight-hour shifts six days a week, was completed to the coal Feb. 16, 1938. Bottom construction, lining the shaft, installing guides and buntons and other necessary work occupied the time until July 23, 1938, whereupon the headframe was put up along with the necessary bins, and the hoist and power house. All machinery, including the hoist, was installed by the coal company and the first slate was dumped Jan. 26, 1939.

After the coping was set on solid rock, the shaft was sunk in 40-ft. lifts. In other words, after excavation had been carried down about 40 ft., another section of the concrete lining was installed. Thickness of the concrete on the ends is 12 in.; on the sides, 20 in. Test holes were carried ahead of the sinking and when water was encountered the stratum was grouted and allowed to set before sinking was continued. In placing the concrete lining, pipes were left for later grouting behind the lining at points where it might be necessary and water pans were fastened to the rock and caulked all around where additional means of controlling water were thought desirable. Chief reliance was placed on grouting for stopping seepage, and a total of 694 bbl. of grout was used for this purpose. No water rings were installed, and pipes from the water pans were led to four 3-in. galvanized-steel-pipe risers placed in the concrete and discharging at the bottom. Stepped closure joints were employed where one 40-ft. section of lining met another. Concrete for a section was poured in lifts of about 8 ft., working from the bottom up, and at each 8-ft. joint a strip of galvanized steel about 1 ft. wide was placed in the concrete all around the shaft, primarily to prevent grout from working through the joints.

Fig. 1—Nickeson shaft design includes such items as brick facing, water pans and cast-steel bunton supports set in recesses in the lining.



Lining Brick-Faced

After the concrete lining was placed it was lined with 4 x 3½ x 8½-in. brick, as it was felt that a brick facing would be less subject to spalling or cracking due to moisture and freezing and thus would protect the concrete. As can be seen in the detail of the closure joint (Fig. 1), recesses were left in the concrete all around the shaft at these points. The bricks were placed endwise in the recesses, thus providing a bearing for those above. Additional brick header recesses 39 in. long, two on each side of the shaft, were put in every 8 ft. as the lining was placed. A brick curtain wall 9 in. thick was installed to form a separate air compartment.

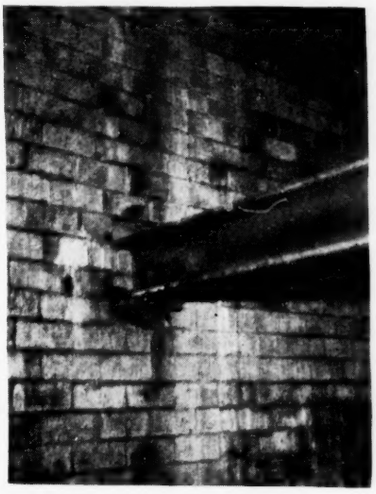
Placing the curtain wall left an air compartment 14 ft. 7½ in. long and 15 ft. 6 in. wide in one end of the shaft. Eventually, a fan will be placed over this compartment. The rest of the shaft is taken up by two hoisting compartments 8 ft. long inside the guides and 15 ft. 6 in. wide. Buntons of 8-in.

Looking down the shaft, showing the yellow-pine guides, brick facing and steel buntons on cast-steel bunton supports.

CB-sections (40 lb. per foot) were installed on 6-ft. centers. In installing these buntons they were laid on cast-steel supports (see Fig. 1, also accompanying photographic illustrations) set in recesses in the lining. With these supports, changing a bunton requires merely unscrewing two bolts on each end, lifting it out and laying in the new. Guides are made of 10 x 10-in. long-leaf yellow pins.

A geared hoist (8-ft. straight drum with 65-in. grooved face) was installed to handle slate and rock cars. This hoist is driven by a 600-hp. 355-r.p.m. 2,200-volt 29-pole synchronous motor. Hoisting distance is 585 ft. Maximum drum speed is 36.2 r.p.m., making the maximum rope speed about 900 f.p.m.; 1¾-in. 6 x 19 plow-steel ropes are used. Cage weight (self-dumping units with double dogs to accommodate two different car wheelbases) is around 16,000 lb. as a result of using alloy steel. With plain carbon steel, weight would have been about 19,500 lb. Alloy steel also provides corrosion resistance. Cars weigh 6,000 lb. and have been loaded with 10 tons or more of rock. The usual load, however, is 6½ to 7 tons.

Hoisting capacity is one car a minute, the time being made up of 7 seconds for caging (automatic cager) and 53 seconds for hoisting. Loaded and empty tracks on the bottom are protected by 14-in. H-sections on legs made of 6⅝-in. scrap pipe with bearing plates welded on the ends. Lagging over the crossbars consists of a Jones & Laughlin 12-in. "Junior I-Beam" building section. The hoist control is of the contactor type, and the protective devices include an automatic control backed up by limit switches on the guides to prevent overwinding in case of failure of the primary control. These limit switches are set to act about 1 ft. later than the regular control. The hoisting unit also is equipped with a separate "man control" which acts in conjunction with the automatic control to slow down the cage speed to 600 f.p.m. Signal lights in the engine room and at the top and bottom landings show which cage is in use for men. Gates at the top landing are equipped with switches to kill all power on the hoist control circuit as soon as they start to open.

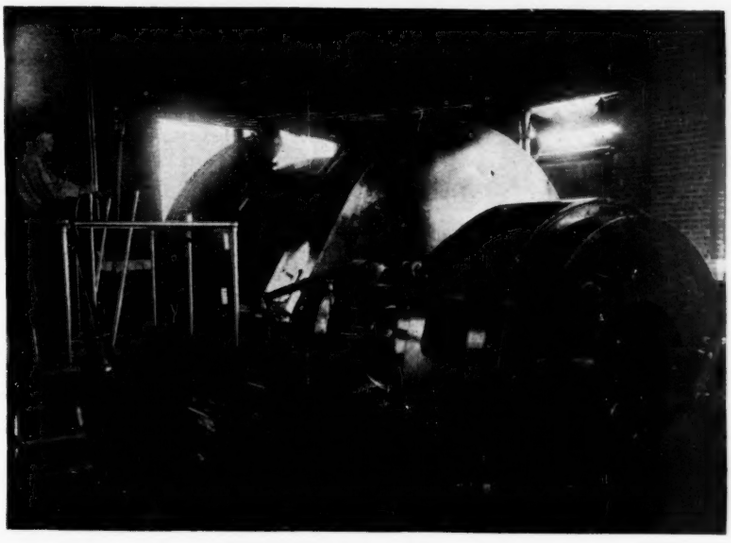


Close-up of a cast-steel bunton support in a recess in the shaft lining.

Slate is dumped into a 240-ton bin with two motor-operated undercut gates. At present, the slate is fed out into a two-way side-dumping motor truck for transportation out on the refuse bank, where it is spread by a bulldozer. Disposal is done by a contractor. The installation is designed, however, so that a larry may be used by putting in the necessary tracks from the bin out onto the dump, but it is expected that it will be a long time before this is done. The ground available for waste (160 acres, practically all downhill from the bin), at the present rate of production, should take care of the output for about twenty years.

In addition to the hoist and controls, the hoist house also includes a section for a d.c. substation feeding the underground workings through boreholes near the shaft. Conversion equipment consists of two 600-kw. 600-volt tank-type mercury-arc rectifiers. The rectifiers operate in parallel with other motor-generator sets serving the mine, and will remain in the present location for about fifteen years. Positive and return lines are taken down into the mine in two separate boreholes in accordance with usual Vesta practice. Boreholes are 10 in. in diameter and are cased to the solid rock only. Three 2½-in. I.D. conduits are placed in each borehole and are concreted in place. Thus, each borehole can accommodate three positive or three return cables, each in a separate conduit. Only one 1,500,000-circ.mil rubber-insulated positive and one bare return of the same size are in use at present. Cables are suspended by means of strain clamps, which are hung on porcelain insulators. The insulators in turn are suspended from structural-steel headframes resting on concrete piers.

This new geared hoist handles a refuse car a minute.



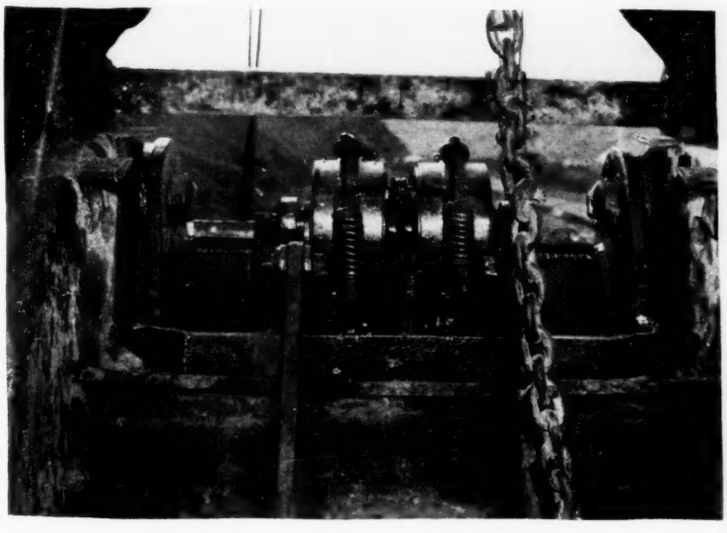
WHAT'S NEW IN OPERATING IDEAS

Dipper-Door Control Reduces Slap

A dipper-door control designed to lessen the "slap" in doors of strip-mining and excavating shovels, thereby increasing speed of operation and decreasing cost of production, has been perfected by a shovel operator for a large coal company, reports Vance Sappenfield, Linton, Ind. It has been proved that dippers equipped with controls give better yardage. Since most operators "ease up" in the lowering of the dipper, so that the door won't hit the bottom with such terrific force, this "easing" causes a considerable loss of time, decreasing the number of cubic yards moved by the shovel during a working day. These controls, too, practically eliminate the cost of upkeep caused by the breakage resulting from the force with which the door strikes the bottom of the bucket. The recently patented control has been in use on a 17-cu.yd. electric shovel for eighteen months. These eighteen months, the inventor says, have demonstrated that the control will last as long as the machine itself, with very little expense in upkeep.

The control is designed with a drum which rotates between two brake shoes automatically creating the desired amount of friction after simple adjustments are made on the device. When this control has been installed, the inventor states, the door of the dipper is "eased" down automatically, allowing it to close with only a slight jar without any attention from the operator. The control, it is stated, not only protects the door and bucket from breakage caused by the continuous "slap" but also reduces the wear on hinge pins and bushings. Furthermore, it eliminates shock and vibration to the "sticks" and the rest of the machine.

The brake shoes ease the door down.



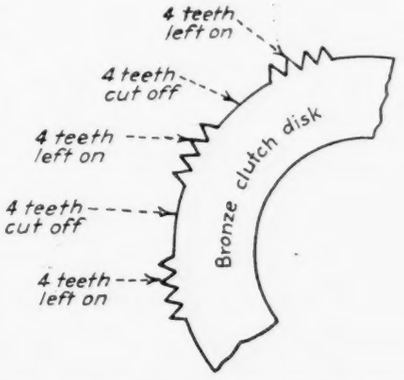
•

Front Clutch Trouble Solved On Loading Machine

For the past five years we have been using an 11-BU loader, writes Thomas James, mine foreman, Knox Consolidated Coal Corporation, Bicknell, Ind. During this period considerable front-clutch trouble was experienced, in common, it is reported, with many other companies. Two new clutches were installed without charge and considerable experimentation failed to produce a remedy until just recently.

The difficulty was that the front clutch could not be stopped without stopping the driving motor. Also, with a load on the machine, the clutch could not be engaged while the motor was running and when started from a standstill required considerable babying. In a seven-hour shift, a time study showed that the unit loaded 150 cars, averaging 3¼ tons per car. Lost time, due entirely to clutch trouble, was 20 seconds per car, or a total of 50 minutes. In addition, the amount of spillage from the loader during car change necessitated two men cleaning up. Thus it is evident that the trouble was serious. The solution finally evolved is described below.

The clutch is made up of alternate bronze and steel disks. On each of the bronze disks



Alteration of bronze clutch disk to solve front clutch trouble.

cut off four teeth. Then leave four and cut off four more. Do this all around all of the bronze disks. Assemble the clutch, using the same number of disks as before, being sure that the four teeth of each disk are in line. Discard and replace all warped disks. Use the same spring pressure as before.

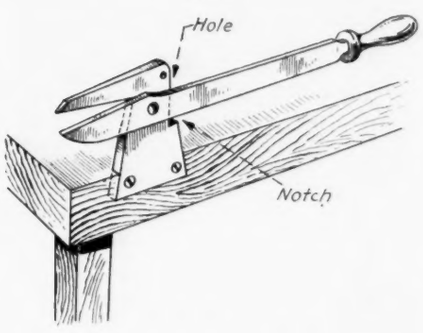
With this change, "I feel safe in saying that the trouble is licked. The remade clutch has operated for more than two months, has loaded approximately 20,000 tons, has been adjusted but once, and is going good."

•

Improved-Type Bench Shear Made of Flat Mill File

"Nothing is more useful than a good bench shear, or snip," writes Charles H. Willey, Penacook, N. H., in describing a unit made of materials at hand in the usual shop. The essential parts are a 14-in. worn mill file and a piece of flat

How the shear is made and installed on the bench.



tool-steel stock. The accompanying sketch shows the method of manufacture. The base is dovetailed into the bench to make the tool rigid and the blade is notched at the rear to permit shearing small rods or bars. A hole above the blade hinge permits cutting wire pins readily.

•

Wood Used Temporarily As Cylinder Head

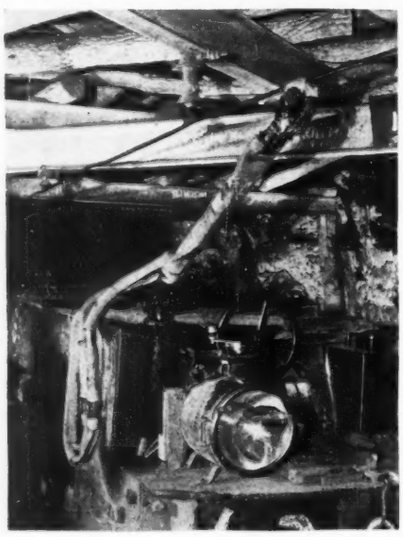
When the nut on the piston rod of a No. 9 Cameron fire pump worked loose and struck and broke the cylinder head, an emergency repair was accomplished by cutting a section of sheet metal the same size as the head, writes Paul C. Ziemke, Milwaukee, Wis. Boltholes were cut in the sheet metal to match those in the head. Then a piece of oak plank 3½ in. thick and 2 in. larger all around than the metal templet was cut out on a band saw, after which it was bored, using the templet to locate the holes. New stud bolts long enough to extend through the wooden cylinder head replaced the regular short bolts. After these were in place a new gasket was fitted and the metal templet was put on ahead of the new wooden head. Careful tightening of the bolts all around completed the job, "which held securely until the foundry and machine shop fashioned the proper head."

•

Plugs Prevent Torn Wiring When Pole Pulls Off

To prevent tearing out the main cables and also eliminate arcing inside the locomotive frame when the trolley pole catches on an I-beam or other overhead structure and pulls out, auxiliary plugs are installed on the sides of the main-line locomotives at the New Orient mine of the Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill. The idea was originated by A. G. Shaffer, chief underground electrician, and a typical installation is shown in the accompanying illustration.

Connectors are on the side to permit the pole to pull out without damaging the motor wiring or arcing inside the locomotive frame.



The motor cables, as shown, are brought out to the outside of the locomotive frame, where they terminate in the male halves of two Miller connectors. The female halves of the connectors are on the ends of the two leads from the trolley shoe. Thus, when the pole pulls out, the leads from the shoe simply pull out of the female connector halves without damage to the wiring. In addition, any arcing takes place outside the locomotive frame.

•

Strips in Conveyor Bottom Move Coal Over to Gate

Where multi-compartment conveyors are used, difficulty sometimes is encountered in getting the coal to spread out after it leaves a compartment and, for example, feed uniformly into a gate in the bottom. At the new No. 22 preparation plant of the Clemens Coal Co., near Mulberry, Kan., this difficulty has been solved by placing guide strips in the bottom of the conveyor. These strips, as shown in the accompanying illustration, project up slightly from the bottom but are not high enough to catch the flights. In operation, they pull the coal away from the side of the conveyor and distribute it over the bottom before it comes to the gate.

The guide strips (arrows) distribute the coal after it leaves a compartment.

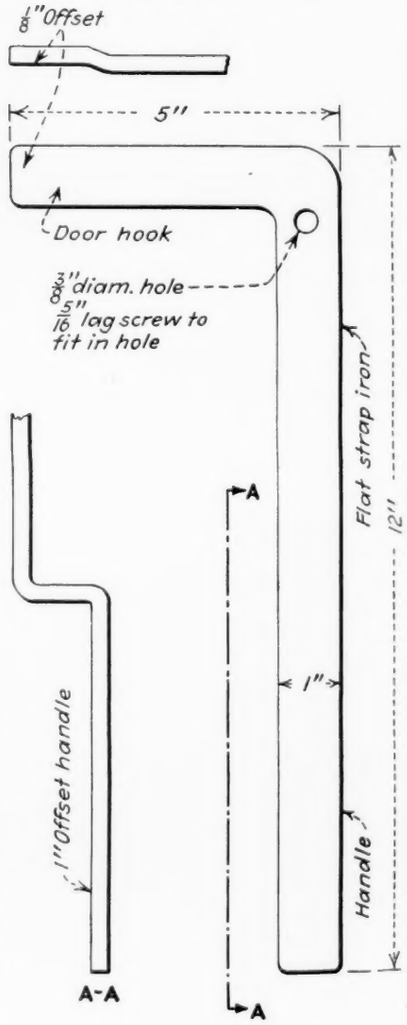
•

Iron Fastener for Mine Doors

An iron door fastener to supplant the ordinary wooden button used to hold mine doors open is suggested by Burrell L. Curry, Marianna, Pa. After a wooden button is used a short time it wears loose on the spike and becomes susceptible to vibration. As a result, it may permit the door to close prematurely, resulting in the destruction of the door, derailment of cars and interruption of the ventilating current. Many serious accidents to motormen have resulted from mine doors closing while the trip was passing.

The iron door fastener shown in the sketch has proved to be dependable, is easily made by the blacksmith, and can be quickly installed. It is used in the same location as the wooden button. Made from ⅜-in. flat strap iron about 1 in. wide, the door fastener turns freely on the holding lag screw with washer, which should be ap-

Sketch of mine-door fastener made from ⅜-in. flat strap iron.



On Ice

Laying something by for a rainy day is a highly regarded objective anywhere you look. But in addition to cash for coffee and cakes a man also is well advised to put a few ideas on ice against a day of need in the future. This department is designed to present each month a number of ideas developed by operating, electrical, mechanical and safety men all over the country and suitable for such laying away. You can keep the ball rolling by sending in that kink you figured out for cutting cost, saving time or promoting safety. Include a sketch or photo if it will help to make it clearer. For each acceptable idea, Coal Age pays $5 or more on publication.

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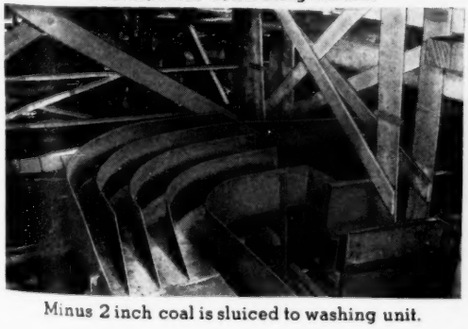
Nordberg Vibrating Screen for sizing stoker coal from the dewatering screen.



Minus 2 inch coal is sluiced to washing unit.

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plied so that when the door is open the weight of the handle keeps the door hook in a horizontal position, this holding the door. When the door is closed, the handle is held in the off, or horizontal, position by the friction of the offset at the end of the hook against the prop to which it is attached.

•

Where Trolley Shoes Should Be Used

Generally speaking, trolley-shoe collection is advantageous under almost any combination of conditions, states *O-B Haulage Ways*. "The long contact area of the shoe eliminates the so-called 'point contact' and the shoe has a tendency to follow the irregularities of the wire more closely. This latter characteristic can be demonstrated by comparing the smoother riding qualities of a sled with that of a spinning wagon wheel. Both these characteristics eliminate harmful arcing, which inevitably reacts to the detriment of both wire and collector. However, there is no objection to the use of a wheel for gathering haulage where locomotives of 10 tons or less are used and where currents of from 100 to 600 amp. are the rule.

"The size of trolley wheels for use on smaller locomotives depends on the haulage speed. If the locomotive operates at low speeds the 4-in. wheel is satisfactory. For higher speeds, 5- and 6-in. wheels will give better service.

"These simple rules can be used as a general guide in current-collection practice.

"1. Don't use trolley wheels on locomotives drawing more than 600 amp.

"2. If the average life of a trolley wheel is one month or less, a trolley shoe should be substituted.

"3. Where shoes are needed, it will be found that the life of a shoe will be at least double that of a wheel.

"4. Where shoes are used, it is advisable to lubricate or condition the wire periodically.

"Aside from the factor of service life, there are several other points which should be considered in selecting a current collector. From a safety standpoint it is desirable to use trolley shoes for all locomotives. The reduction in arcing or flashing will eliminate the shower of sparks that the motor operator is likely to experience from time to time when a wheel is used. Shoes, in consequence of their gliding, sled-like motion, cling better and have less tendency to leave the wire. Such dewirements are dangerous to equipment and men alike."

•

Man-Trip Brake Blocks Cars On Seven-Per-Cent Slope

Where man-trips have to be raised or lowered on pitches, the management is always on tenterhooks for fear a rope or coupling may break and the trip run away. At Glace Bay, N. S., the Dominion Coal Co. has a form of brake that it uses on its man-trips, which, without derailing the car, will bring it to rest promptly even on a 7-per-cent grade. The ordinary brake will stop the wheels from turning, but, as these have only a line contact with the rail, they will skid along the latter with no great resistance. The brake used at Glace Bay forces a wood block between the track and the wheel, which latter is lifted off the rail. The resistance of the block to travel along the track is, therefore, much greater than the resistance of a wheel when held by a brake. A further advantage of this braking method is that its application does not result in the formation of flats on the wheels.

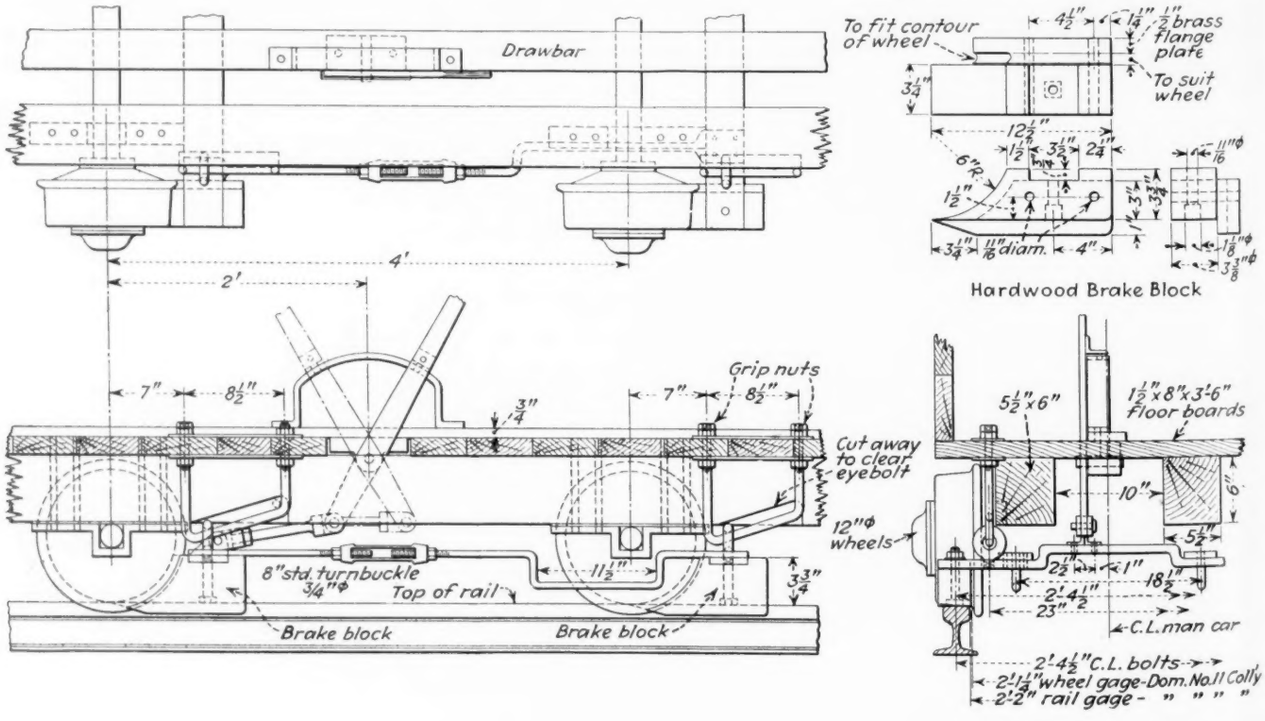
A shoe 12½ in. long beneath each of the four wheels of each man-car stalls the trip effectually on throwing a lever.

Cables Cast Into Concrete Served as Long as Needed

. Upon discovery during a week-end that a disturbance of the strata or other unknown cause had made an opening in the steel casing of a cable borehole and diverted a large and continuous flow of water into Mine No. 21 of the Island Creek Coal Co., Holden, W. Va., there was just time enough

Cables served for three years after the borehole was filled with concrete.

before serious flooding to cut off the flow by plugging the hole at the bottom and pouring it full of concrete from the top. Whether to pull out and thus recover the electric cables, but disrupt service to that section of the mine, was hurriedly decided in the negative. Then after the cables were concreted in, there arose the perplexing question of whether to put down another



The belt that leads with its chin always takes the count

A typical example of Goodrich development in rubber

IN MINES, quarries, manufacturing plants, miles of conveyor belts of rubber and fabric are turned by pulleys, to transport material cheaply. But what happens at the point the materials (huge rocks, for instance) are dumped onto the moving belt? The belt takes a terrible beating. Held rigid by the supporting pulleys, the belt has to absorb the blow—and naturally wears out.

All sorts of devices were tried to let the belt pass on the impact, but none was successful.

Then Goodrich engineers had an idea. They had developed a new kind of spring for street cars, able to carry enormous loads smoothly. Why not a rubber spring for the pulley supports below a conveyor belt? The pulley would then be floated on a rubber spring, and the belt could pass on its blows to this spring, which would absorb the impact.

Goodrich tried it. Tests show that this new development increases a belt's resistance to impact 4 times, and can increase the life of the belt as much as 10 times! Goodrich Shock Impact Idler Mountings are now at work, saving money for users of conveyor belts, reducing handling costs per ton.

This is typical of the results of Goodrich research—developments being made constantly in the 32,000 items we make are applied to all others in the line, so that when you order Goodrich belting, hose, rolls, tanks or any other Goodrich product you can know you are getting all the benefits in long life, improved service, low maintenance which this Goodrich improvement program makes possible. The B. F. Goodrich Co., Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

(*Another story of Goodrich Development appears on page 3*)

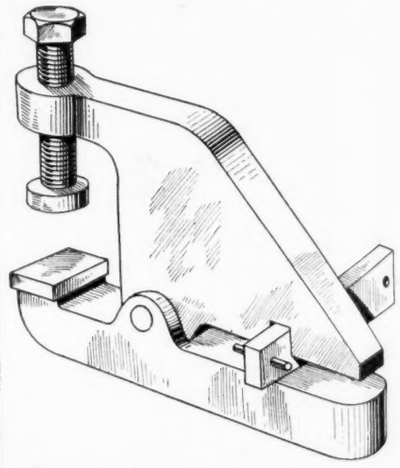
borehole and install new cables for use in case the original cables should fail. This question also was decided in the negative, thereby saving the expense. And no trouble was experienced with the incased cables during the three years that mining in that section required the use of the borehole.

This borehole, now unused, and the substation building from which the electrical equipment has been moved to another location are shown in the illustration. The hole is 342 ft. deep and lined with 5⅝-in. casing. In the hole are four 500,000-circ.mil cables which are rubber- and braid-insulated for 600 volts but were operated at 275 volts. These cables, two in parallel on the positive side and the two other on the negative, had served in that location five years before being incased in the concrete.

•

Quick-Releasing Shop Clamp Uses Wedge to Hold Work

"One of the mechanics at the shop designed a quick-releasing clamp which proved so handy that many of them have been made," states Charles H. Willey, Penacook, N. H., in forwarding the accompanying sketch of the device. The clamp, he declares, is radically different in that it is hinged so that it will accommodate irregular work. In use, the



The wedge forces the clamp down on the work.

clamp is set down on the work with the wedge partly inserted, after which the wedge is tapped with a hammer to make the clamp grip tightly. To loosen the clamp, all that is necessary is to strike a blow or two on the small end of the wedge.

•

Hard Sheaves Increase Wire-Rope Service

It is false economy, states Macwhyte Co., Kenosha, Wis., to operate wire rope over badly scored and corrugated sheaves. "Watch your sheaves—keep them smooth—and get longer wire-rope service."

Contradictory as it may seem, a soft iron sheave that wears rapidly will cause more wear on a wire rope than sheaves of harder materials. A sheave of softer material than the rope is likely to take an impression

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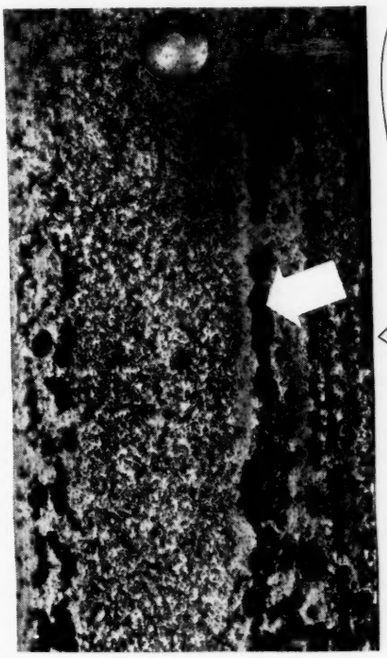
IMPROVED SLUSHING COMPOUND
to protect highly finished metal surfaces



Look at the Difference!

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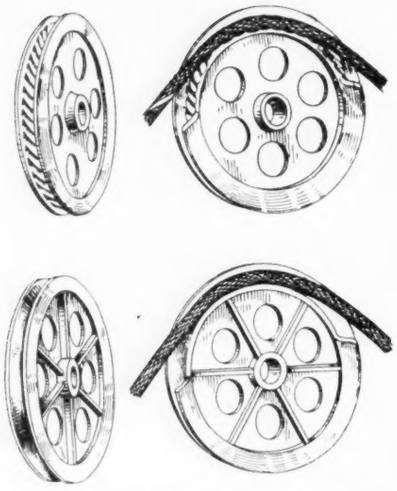


Above—Soft sheave often corrugates, shortening life of rope. Below—Smooth wearing surface of hard sheave permits rope to give good service.

and become deeply scored and corrugated, presenting a ragged surface which damages the rope and causes excessive wear. A new wire rope used on a corrugated sheave will not track in the corrugation made by the previous rope; it will wear rapidly and fail to give maximum service. The groove also will wear deep and the flange of the sheave will cause excessive wear.

Sheaves made of harder materials, such as carbon steel, manganese, other alloys, or "work-hardening" steels, wear smooth, last longer and allow the rope to give the best service. The smooth wearing surface of a hard sheave gives the rope a smooth bearing surface that lengthens the life of both sheave and wire rope.

•

Cesspool Overflow Problem Inexpensively Solved

Since many mine properties are dependent upon cesspools for sanitary facilities, the difficulty of maintaining them in efficient operation presents a serious problem. Paul C. Ziemke, Milwaukee, Wis., gives a description of the methods employed to improve runoff conditions for a large cesspool serving the office and manager's residence of the Mineral Hill Mining Co. The heavy spring rains so thoroughly saturated the ground, already rather impervious, that cesspools were rendered practically useless. The pool overflowed onto the lawn and walks, producing a serious health hazard.

Past methods already tried for remedying the condition were to build a cesspool twice as large as needed (the best, though most expensive, method), or to dig trenches radiating from the cesspool and fill them with cinders or gravel. It was decided that a quicker and less expensive method could be employed. This method is described below.

The cesspool selected for the experiment measured 25x50x12 ft. Holes were drilled to a depth of 14 ft. As each hole was completed, the bottom of the hole was sprung by firing a 2-lb. charge of 40-per-cent gelatin. After a pair of holes were drilled and sprung, a 6-lb. charge was fired in each hole, using a delay cap in one hole in order to minimize the report and vibration. By drilling and shooting the holes in such a manner, underground voids were formed between each pair of holes.

To begin the experiment, two holes 14 ft. deep and 6 ft. apart were drilled, sprung, and shot close to the cesspool. A third hole then was drilled, sprung, and shot in the interval between the cesspool and the other two. Water in the cesspool was lowered several feet, proving the practicability of the method. Successive pairs of holes (each pair 6 ft. apart) then were drilled and shot until the lake shore about 100 ft. away was reached. Completion of the connection of the underground voids was demonstrated by the dynamite fumes coming from both the new and old holes. Also, water could be heard entering the voids.

The strata consisted of 2 ft. of top soil, underlaid with hardpan and a gravelly shale. To drill the holes a screw auger with a T handle was made in the shop. A 2½-in. ship auger was welded to a 5-ft. length of 1-in. pipe, threaded on the opposite end so that additional 5-ft. extensions could be added. The T handle was made of a 1-in. pipe tee and two 1-in. nipples 12 in. long. One man could operate the drill in the 2 ft. of top soil but three men often were needed when digging below that stratum. Small granite boulders frequently were encountered which had to be broken with ⅛- to ¼-lb. charges of dynamite. The use of small quantities of water aided in drilling the hardpan, and light charges of explosive at 2-ft. intervals also aided by loosening the ground.

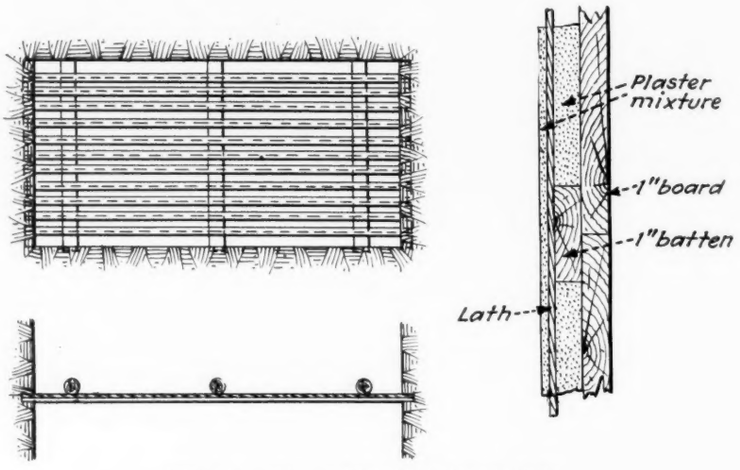
Completion of the work, loosening a 25x100-ft. area, required 64 man-hours of labor, 200 lb. of explosives and 375 electric blasting caps. Little damage was done to the surface.

Further plans include the use of an air drill and auger bits. Clogged holes, caused by the springing shot, will be reopened by driving pointed thin-walled conduit into them.

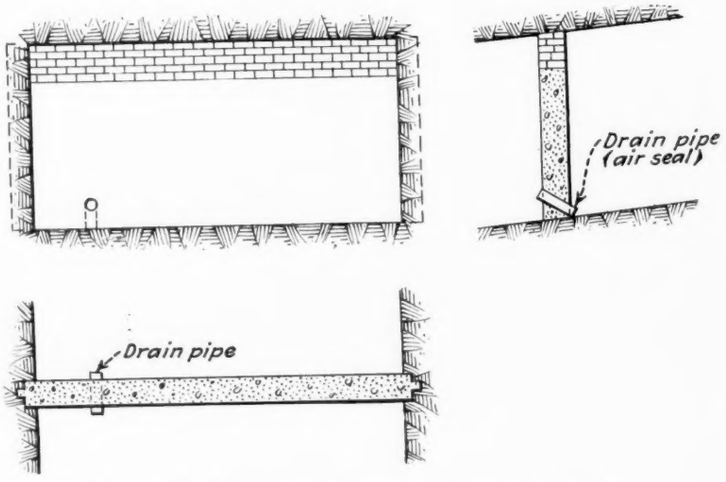
•

Wood Brattice Tightened By Hard Wall Plaster

Plaster is being used by the Dominion Coal Co., Sydney, Cape Breton, Nova Scotia, in the construction of temporary brattices. Three posts are stood, one at the center and one near each rib. To these are nailed a solid 1-in. board stopping from floor to roof with other 1x3-in. battens across the cracks. Plaster is laid



Wood stopping coated with lath and plaster.



Dominion Coal Co.'s standard permanent concrete stopping.

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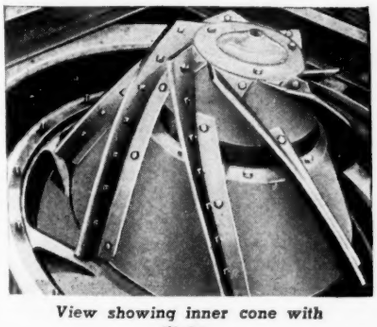


View showing inner cone with flights.

As easy to operate as an ordinary electric motor — save time and labor.

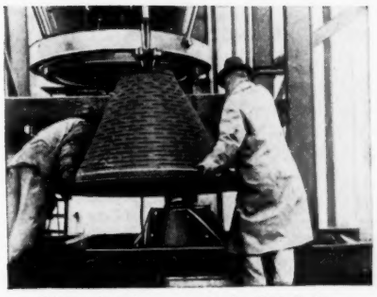
In all comparisons made, the maintenance cost per ton of material processed is much lower for the ELMORE. Requires no heat.

Saves large initial investment for equipment and floor space.

Reduces moisture and ash content and removes coal from slurry, making large daily savings.

Makes it possible to reclaim sludge and turn it into a salable product at low cost.

Gives you more tonnage while keeping costs down.



View showing screen basket being superimposed on inner core.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

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between these boards and over all a coating of vertical laths and plaster is applied that makes the brattice airtight.

When a permanent stopping is desired, a concrete wall is erected surmounted by a few rows of well-cemented brick between concrete and roof. The concrete wall is notched solidly into the rib on either side. A drain pipe is provided that permits water to escape from behind the wall but is so sloped upward toward the haulageway that the water will have to rise some inches before it begins to escape. In this way, the water will cover the mouth of the pipe at its lower end and prevent the escape of air.

When mine doors are erected with an air pressure of less than 1-in, water gage, the sidewalls, or jambs, are built with hard wall plaster and lath similar to that used in the construction of temporary stoppings. Where, however, higher pressures are encountered, concrete is used always for these door jambs.

•

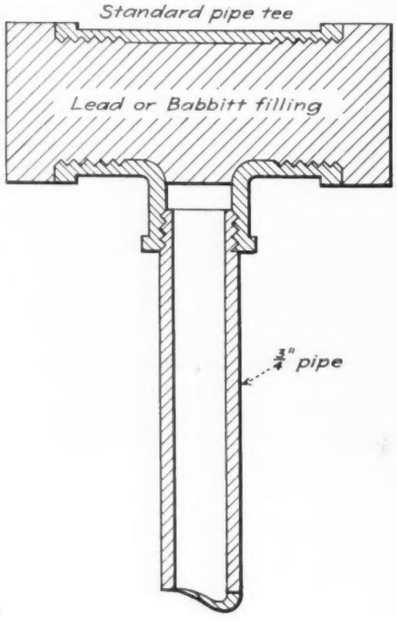
"Soft Hammer" Easily Made From Pipe Tee

For striking and driving bolts, nuts, shafts, pipe and similar machine parts that must not be scratched or battered, a "soft hammer" should be used. Rawhide-faced and wooden hammers do not scratch or batter, but usually are too light for good performance, writes Paul C. Ziemke, of Milwaukee, Wis.

The useful and easily constructed "soft hammer" shown in the accompanying sketch is made from an ordinary standard tee pipe fitting and ¾-in. pipe. The tee, when filled with lead or babbitt, serves as the hammer head, and the pipe as the handle.

For pouring, a mold may be made by wrapping paper around open ends of the tee to form the face of the hammer. It is not necessary to fill the tee entirely full of molten metal; pieces of scrap metal may be used to fill most of the opening. Scrap pipe plugs, for instance, are good fillers. This type of hammer can be made in almost any desired weight because of the many standard sizes of pipe fittings. The one illustrated weighs about 4 lb.

Showing use of pipe tee in construction of "soft hammer."

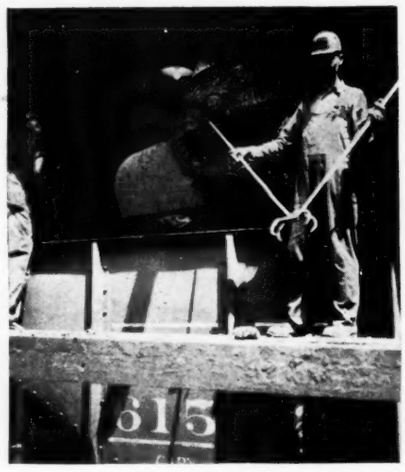


•

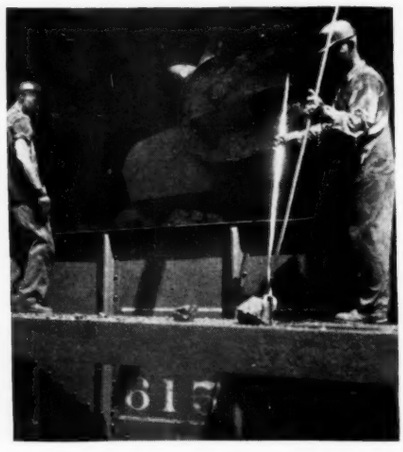
Slate Snatched on the Fly By Means of Long Tongs

"They shall not pass" expresses the modern standard of preparation with respect to pieces of slate in coal. At the Island Creek No. 1 mine, Holden, W. Va., a new and almost invaluable weapon against occasional pieces of slate or bone is a set of long specially made tongs used by an inspector who stands on the car trimmer's platform at the lump boom. Eliminating with certainty those occasional pieces of impurity is the major advantage. Next, tipple shutdowns to recover an impurity have been eliminated and, thirdly, the inspector's fingers have been removed from the danger zone.

After becoming accustomed to the use of the tongs an inspector is able to reach far down into the car and grab a piece of impurity before it becomes covered. Formerly the tipple had to be stopped and, even so, the time element involved and the coasting of the boom often would cover the piece so that digging was necessary and sometimes the piece could not be located. Such stopping was expensive from the standpoints of delayed operation, power required to restart and extra duty imposed on equipment by the frequent starts. Handles of the tongs, 5½ ft. long, are made of ¾-in. pipe and the maximum opening between teeth is 8 in. When closed so that the tooth points touch, the circle formed by the teeth is 5 in. in diameter.



Wide open, the tongs will grab an 8-in. piece.



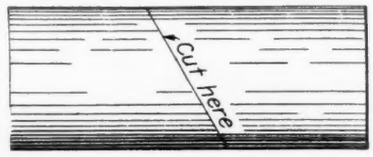
Depositing on the platform a piece of bone that was yanked from deep in the car without stopping the boom.

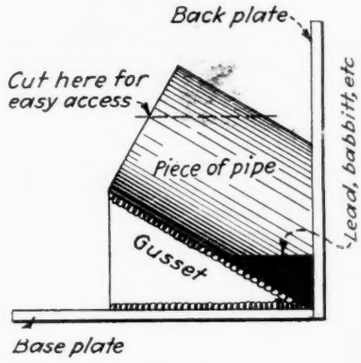
•

Small-Parts Holder Is Portable

Misplacing small parts is a common, disagreeable experience. John E. Hyler, Peoria, Ill., has overcome this difficulty by constructing a small-parts holder made from a piece of pipe and scrap steel plates.

Two pieces of pipe suitable for holders





Details of small-parts holder.

may be cut from one short scrap as shown in the accompanying illustration, the angle of cut, about 30 deg. from square, giving the container sufficient pitch when welded so that parts will not spill from it, yet are easily removed with the fingers. The base is welded at right angles to the back plate and the piece of pipe welded to these plates. A small right triangle plate, welded between the baseplate and pipe, strengthens the assembly. Capacity of the holder is determined by pipe diameter, and to permit easy access with the fingers a portion of the top may be cut away. Molten lead, babbitt or similar material poured into the container will eliminate the sharp corner in the bottom so that the last small part can be readily retrieved. A progressing array of parts may be obtained by lengthening the base and welding on a number of containers. It is especially convenient to set the small-parts holder against the wall on top of a bench but it also may be carried to any desired location.

WHAT'S NEW IN THE FIELD

Night Sessions Held as Hearing On Coal Prices Nears End

Washington, D. C., Dec. 18—Night sessions are being held by the Bituminous Coal Division as the final price hearing nears completion of its fifth month. With the presentation of individual producers' protests getting under way on Dec. 11 it was a foregone conclusion that sessions would extend into the new year.

In the presentation of the Government's case on proposed prices Dr. Charles J. Potter was its chief witness, occupying the stand the greater part of 30 days, presenting voluminous testimony and undergoing prolonged cross examination. Supporting testimony on costs and realization was adduced by F. G. Tryon, head of the Division's research section, whose data included about 30 exhibits.

Hearing on proposed maximum discounts to distributors, which began on Nov. 27, was completed on Dec. 5. Recommendations on proposed prices by district boards were followed by the presentation of protests, first by producers' boards and then by individual companies.

Secretary Ickes and Director H. A. Gray of the Division took action Dec. 8 to eliminate a possible legal controversy as to the finality of minimum prices. Director Gray announced that parties so desiring could file exceptions to the Director's order with Secretary Ickes. Mr. Gray said that this further review will not delay the effective date of minimum prices, since Secretary Ickes will consider the exceptions during an interim period which must in any event elapse between issuance of the prices and their effective date to give the bituminous industry an opportunity to familiarize itself with the price schedules and to readjust its own price lists and contracts. An order issued by the director and approved by Secretary Ickes provides that exceptions may be filed within ten days after issuance of the director's findings, conclusions and order.

Southwest Wants Prices Now

Producers in the Arkansas-Oklahoma field members of Arkansas-Oklahoma Smokeless Coals, Inc., the area's regional marketing agency, have asked the Division to establish minimum prices for their coal "at once," asserting that pending the setting of prices under the Guffey act the industry in that region is in "bad shape."

Paul Sifton, of Washington, has been named assistant director of the Consumers' Counsel Division, according to an announcement by Nathan R. Margold, solicitor of the Interior Department.

The steering committee of the Committee for Amendment of the Coal Act met here late in November to formulate a program for 1940, following which John A. Howe, executive vice-president of the Truax-Traer Coal Co. and chairman of the committee, stated: "Plans were discussed in regard to future activity of the committee, and plans made to strengthen the committee and its organization, and aggressively to bring about the relief that is so necessary to industry.

"It is our opinion that Government men intrusted with the job of administering this coal act now know, or are learning rapidly, what we producers have known for some time: that is that this is definitely an unworkable and terribly costly law, and that it must be amended. We know that it is necessary to have this law amended or repealed, and we think it most advisable that we continue to study the needs of the industry and to scrutinize any future proposed legislation, so that not again shall we be called upon to endure the heavy cost and chaotic conditions of experimental laws of this nature."

Harris & Ewing

Dr. Charles E. Potter

A member of the Bituminous Coal Division's marketing section, Dr. Potter was the chief witness in getting the Division's case into the record. He occupied the stand more than 30 days. With degrees in chemical as well as mining engineering, his experience in coal mining has been largely in northern West Virginia, where he represented District Board No. 3 during code authority days.

St. Louis Group to Sift Scheme For Smokeless-Fuel Plant

A resolution recommending that Mayor Dickmann appoint a committee to investigate whether St. Louis might properly construct a smokeless-fuel plant or cooperate with private capital for more adequate production of such fuel was unanimously adopted by the Board of Aldermen on Dec. 1. Introduced jointly by President William L. Mason and Alderman B. Schweppe, the resolution urged that the committee consider the advisability of floating a bond issue to build a municipally operated fuel-processing plant if private capital cannot be interested in the project.

The board directed that the chairman of the aldermanic committee on public safety, Hubert Hoeflinger, be named on the Mayor's committee. It was suggested that the committee include a representative of St. Louis coal distributors, of the Illinois producers, of the Chamber of Commerce, and one or more representatives of the consuming public.

Despite some improvement resulting from the existing smoke-abatement ordinance adopted in 1937, the resolution asserted that "the smoke problem remains acute and demands solution as soon as practicable." Though some smokeless fuels have been placed on the St. Louis market, the resolution stated that these fuels have not been produced "in sufficient quantities nor at a price sufficiently low to meet the needs of the private consumer and invite general use of the products."

Producer Offers Smokeless Fuel

Following introduction of the resolution, Robert Brookings Smith and associates, representing two companies, the Radiant Fuel Corporation, with a plant at West Frankfort, and the Midwest Smokeless Fuel Corporation, at Millstadt, Ill., offered to cooperate with the city or any municipal or private agency for the distribution of smokeless fuels in the city.

Mayor Dickmann on Dec. 5 named Smoke Commissioner Raymond R. Tucker and Dr. M. M. Leighton, director of the Illinois State Geological Survey, as members of a committee to formulate a new program for ridding the city of smoke. Dr. Leighton declined to serve, however, but said he would be glad to act as research adviser to the committee.

James L. Ford, Jr., vice-president of the First National Bank of St. Louis, was chosen chairman of the Smoke Elimination Com-

mittee at its first session, Dec. 13, in Mayor Dickmann's office in the City Hall. Following the session, Mr. Ford said that it had been concerned chiefly with organization but announced that the members would meet again in the Mayor's office to hear Dr. H. A. Buehler, State geologist of Missouri, and Dr. Leighton, appointed by the Mayor as advisers to the committee of seven.

•

Rival Mine Unions Cooperate In Illinois Dispute

The United Mine Workers, bitter rival of the Progressive Mine Workers, rallied to the support of the latter on Nov. 24 in its dispute with the Superior Coal Co., Gillespie, Ill. Ray Edmundson, State president of the U. M.W., pledged his union's support to the P.M.W., and David Reed, president of District 6, P.M.W., accepted and promised similar cooperation to the U.M.W. if and when needed.

"The time has ended," said Mr. Reed, "when companies can play one labor organization against the other to their own advantage. From now on, what is one union's fight will be taken up by the other."

The dispute began on Nov. 17 following discharge of 97 Progressives on charges of slowing down production as the result of a disagreement over division of work. Then the company shut down three of its four mines, throwing about 1,500 men out of work. An arbitration committee composed of Joe McCann and William Campion, representing the miners, and W. C. Gill and Ben Firth, for the producers, has been conferring in an effort to iron out the differences, but has made little progress.

P.M.W. representatives said they were insisting that miners transferred from work in higher wage brackets to duties with lower pay be assured of an opportunity to earn a weekly wage based upon the higher classifications.

Mr. Edmundson said his organization would be on the alert to make certain that the U.M.W. would not be "used as an instrumentality for breaking down conditions of employment prevailing in the mines of this State."

•

Eastman Resumes Use of Coal

The Eastman Kodak Co., Rochester, N. Y., is to return to the use of coal after using natural gas for nearly three years, according to an announcement on Dec. 5. The company, it is said, will consume about 3,000 tons weekly. The switch is being made because of dwindling gas supply.

•

Reitz Builds New Tipples

The Reitz Coal Co., Windber, Pa., has completed a new steel tipple and screening plant at its No. 5 mine, Scalp Level, Pa. With this equipment it is able to produce all sizes of lump, slack and double-screened coal. At its No. 4 mine, Central City, Pa., similar structure and equipment are being installed for production of the same sizes. This installation is to be completed and in operation at an early date.

Operating and Safety Problems Debated At Indiana Institute Meeting

BEGINNING with refuse disposal and ending with an analysis of the factors entering into fires and explosions, the Indiana Coal Mining Institute also considered the subjects of assisting mine ventilation by drillholes and a section foreman's ideas on promoting operating efficiency at the 1939 winter meeting, held Dec. 16 at the Terre Haute House, Terre Haute, Ind. The banquet in the evening was featured by the award of the John A. Templeton trophy, presented annually by the Indiana Coal Operators' Association for the best safety record, to the Baker mine of the Glendora Coal Co.

The Baker award was made on the basis of 272,120 man-hours of exposure, in the course of which sixteen lost-time injuries resulted in a loss of 577 days. Severity rate was 2.12; frequency rate, 58.06; and the grade, or per cent of perfect, was 82.02. In accepting the trophy in behalf of the men at the mine, R. A. Templeton, vice-president, whose father's name was given the award as a result of his work in safety, cited both employees and supervisors for their wholehearted interest in the prevention of injuries.

"The high cost of hand loading and the pressure of competitive fuels, together with the exhaustion of most of the comparatively clean seams of coal," have forced Middle Western operators into mechanical loading, which in turn has "required large investments in coal-cleaning equipment" to properly prepare the product for market, declared A. K. Hert, superintendent, Snow Hill Coal Corporation, Terre Haute, in opening the technical sessions with a discussion of refuse-disposal methods. "The modern coal-cleaning plant greatly increases the quantity of refuse due to the fact that the impurities are removed from the fine sizes as well as the coarse. In addition, the coal producer has been forced by competition and the demands of the coal consumer to adopt the uneconomic practice of wasting large tonnages of fine coal. It is not uncommon now to find a mine wasting a total of up to 30 per cent of the raw input to the preparation plant."

Pointing out that three disposal systems commonly are used where large tonnages must be handled—viz, the electric larry, the automobile truck and the aerial tramway—Mr. Hert stated that when Snow Hill's Talleydale mine was designed "it was recognized that refuse disposal would be an important problem due to the fact that approximately 30 per cent of the raw input to the washery would find its way to the refuse pile." Tentatively, it was planned to use either a larry or a string of cars and an electric locomotive. But severe grades resulted in a study of other disposal methods. This study showed that the cost with larries or gob trains was about 8c. per ton, largely due to labor for leveling the top of the pile and moving track.

"The possibility of using automobile trucks then was considered." A check showed a cost about the same as with a larry or gob train. "The truck system has an advantage over any method of track haulage inasmuch as it is possible to level with a bulldozer." However, the initial cost of enough trucks to handle a large capacity is substantial, and along with this would be a high cost for drivers and maintenance. Trucks also are affected adversely by bad weather conditions.

Low Cost Attained

An investigation into aerial-tramway disposal showed possibility of economical elimination of waste at Talleydale. Consequently an American Steel & Wire Co. tramway, the only one in Indiana, was installed. Of the two-bucket reversible type, with buckets holding 72 cu.ft., the tramway operates at 800 f.p.m. Maximum distance from the tipple to the two tail towers is 1,730 ft. Rated capacity is 90 tons per hour, and the tram is driven by a 60-hp. motor. One man at the loading terminal operates the tram.

"Initial cost of this type of tramway is comparatively high," the Talleydale unit costing $32,000. However, "our experience indicates that the initial cost is fully justified by the low operating costs. We have recorded carefully all of the costs incident to the operation of this tramway, and the total cost per ton of material handled, including operating and repair labor and all materials used, amounted to 2.23c. over three years. Operation also has indicated that turns in the track cables should be avoided. Furthermore, "our experience indicates that the total cost of handling material by this method, including amortization of the equipment, will run slightly less than 5c. a ton. We believe this is a saving of at least 3c. per ton over any other system we could have installed."

Pointing out that the saving cited by Mr. Hert is hardly possible where the refuse output is small, Walter Buss, mining engi-

INDIANA OFFICERS

Chosen to head the Indiana Coal Mining Institute at the winter meeting held in Terre Haute, Ind., Dec. 16, were the following:

President—R. A. Templeton, vice-president, Linton-Summit Coal Co., Sullivan, succeeding H. G. Conrad, general manager, Knox Consolidated Coal Corporation, Bicknell.

Vice-Presidents—H. A. Cross, general superintendent, Walter Bledsoe & Co., Terre Haute; A. K. Hert, superintendent, Snow Hill Coal Corporation, Terre Haute; and F. M. Schull, Binkley Mining Co., Terre Haute.

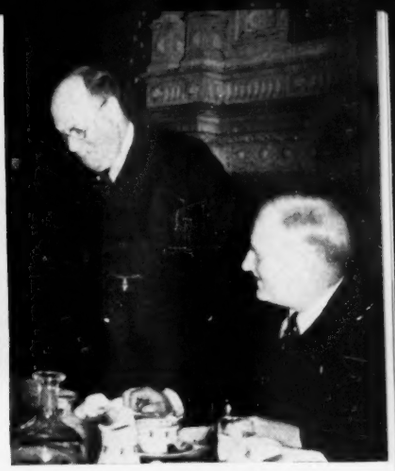
Secretary—Harvey Cartwright, commissioner, Indiana Coal Operators' Association, Terre Haute.

Executive Board—David Ingle, Jr., superintendent, Buckskin Coal Corporation; D. W. Jones, superintendent, Princeton Mining Co.; Birch Brooks, superintendent, Saxton mine, Walter Bledsoe & Co.; H. M. Ferguson, president, Clinton Coal Co.; Crede Fitzpatrick, superintendent, Black Hawk Coal Corporation; Peb G. Conrad, superintendent, Knox Consolidated Coal Corporation; and H. G. Conrad.

Virginia safety measures
ned by N. P. Rhinehart

W. R. Chedsey
Represents Missouri School of Mines

Related?
R. Maize and C. H. Maize



Toastmaster W. L. Affelder
J. I. Thomas and banqueteers respond

The miners' viewpoint
George Cunliffe discusses many problems

Safety booster
Heath S. Clark at banquet

Retiring president
J. V. McKenna

Safe mechanized mining
A. Lee Barrett gives analysis

Newell G Alford, president-elect
congratulated by Syd Hale, of Coal Age

Forbes, U. S. Bureau of Mines

A chip off the old block
Jack Ryan Jr.

Keystone newcomer, H. F. Hebley

Sell cooperation!
W. P. Vance advises

Coal-mining experts
F. A. Jones and A. L. Toenges, of the Bureau

Secretary-treasurer
C. W. Grove

Hobnobbing
L. C. Campbell and D. C. Jones

neer, Knox Consolidated Coal Corporation, Bicknell, stated that with a refuse output of 150 tons per day, as at American No. 2 mine, a $32,000 tramway operating 200 days per year and amortized over twenty years, including interest on the investment, would result in a fixed charge alone of $12.80 per day, or 8½c. per ton of material handled. With a labor charge of $5.20 per day, the total would be 10.23c., not including maintenance. However, with a smaller capacity, a smaller first cost might be obtained, although care should be taken to see that extra labor was not necessitated in an attempt to cut this cost.

With an aerial tramway, firing of the dump would inevitably result. Consequently, Knox Consolidated prefers to compact the gob and likes the dump-truck system, using a bulldozer and tractor to level off and compact the pile. No. 2 disposal is contracted at $1.50 per hour, and at present, pending arrival of the bulldozer and tractor, two men, at 41c. per hour, are employed in leveling. With two men and the truck, the cost is $17.06 per day, or about 11.4c. per ton. With the bulldozer, labor will be cut, but this will be offset by the cost of amortizing the equipment, interest, etc.

A larry has proved quite satisfactory at the New Hope mine of the Linton-Summit Coal Co., Linton, said William Cunningham, general superintendent. Its installation solved a big problem growing out of lack of a good place to dump with the dirt cars and 6-ton locomotive formerly employed. The aerial tramway was considered, but, on learning that a larry would negotiate 10-percent grades, an investigation was made and a 6-ton 42-in.-gage three-way-dumping unit was installed. It hauls 1,500 ft. and the labor cost is 4c. per ton, which could be cut if sufficient refuse was made to keep it busy all the time. Only a few minor repairs have been made in three years.

Auto Truck for Rock Disposal

Discussing the relative merits of other types of equipment, Mr. Cunningham observed that the auto truck looks good for disposal and that the aerial tram would be cheapest over a period of years where the volume was large. In larry disposal, he felt that a better car would promote efficiency and lower cost. Possibly a car could be put on an auto truck, perhaps in conjunction with a machine for leveling. Fires at his operation were overcome by crushing the refuse, which permits it to pack better. This would particularly lend itself to the packing propensities of the auto-truck-type equipment.

With much of the good coal gone and more and more dirty coal and bad top ahead, refuse output will increase, declared H. A. Cross, general superintendent, Walter Bledsoe & Co., Terre Haute. The operators, therefore, should start a research program to develop a use for such waste material before some outside interest beats them to it. Possibly, said C. A. Herbert, supervising engineer, Vincennes (Ind.) station, U. S. Bureau of Mines, refuse could be burned under fixed conditions in some type of equipment to produce a material which, even if not salable, would not burn further when wasted. The Bureau, he stated, has agreed to run tests on refuse samples submitted to determine their character and the possible products, which might include railroad ballast or road material. Sulphur fumes from burning refuse are objectionable, said Joseph W. Anstead, Sullivan, Ind., electrical engineer, Templeton-mine group, including Linton-Summit.

Coming Meetings

- International Heating and Ventilating Exposition, Jan. 22-26, Lakeside Hall, Cleveland, Ohio.
- American Institute of Electrical Engineers: annual convention, Jan. 22-26, 29 West 39th St., New York City.
- United Mine Workers: golden anniversary convention, beginning Jan. 23, Neil House, Columbus, Ohio.
- Pocahontas Electric and Mechanical Institute: annual meeting, Jan. 26, Bluefield, W. Va.
- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 12-15, Engineering Societies Building, New York City.

"The management at our mines has been contemplating for some time a method of improving our ventilation," remarked Mr. Anstead in a paper on drillholes for air. "True, we had more than enough air" as far as the law went, "yet we felt it necessary to have that added kick which is so necessary to good ventilation." As the development plan for years had been based on main entries made up of two headings, the main haulway had to be used as the main return, with the result that the flow of air was nearly blocked many times a day when trips were running against it. A larger fan, it was found, would be of no benefit, while a third heading, which would have solved the problem, was out of the question. Sinking an airshaft seemed the only solution, but the cost would have been almost prohibitive in view of the character of the overlying strata and other conditions. The airshaft also would serve as an escapeway, another reason why it was so attractive.

Borehole for Ventilation

"Finally, the idea of drilling a large hole into the main return line at a point close to the return from our last cross entry to relieve friction on our return air was advanced." This hole, at the Baker mine of the Glendora Coal Co., was put down 8,500 ft. from the downcast shaft. "For casing, we decided to use ⅜-in.-thick steel plate 84 in. wide and 8 ft. long rolled into a tube and the seams welded, giving us a tube with an inside diameter of 26½ in."

After the hole was down about 20 ft., one section of the casing was placed and driven down to the floor, whereupon the second length was put on and butt-welded. This was followed by driving down the casing and welding on another section, which process was repeated until 110 ft. of casing was in the hole, this being the depth to the solid. Drilling passed through considerable quicksand and water. The casing was anchored at the solid and drilling resumed, the 24-in. bit working inside the driven casing. The hole was drilled into a 32-ft.-wide pillar, giving support to the roof while drilling was in progress.

With drilling completed, a 24-in. casing was placed in 40-ft. lengths. The lower end of the lower section was closed with a welded-on ½-in. plate with a 2-in. hole in the center. As the hole had been allowed to fill with water, this let the casing sink slowly and smoothly to the bottom. The inside casing overlapped the drive casing some 15 ft. Total hole depth was 210 ft. The final operation was concreting the casing, after which an opening was driven to the bottom of the hole.

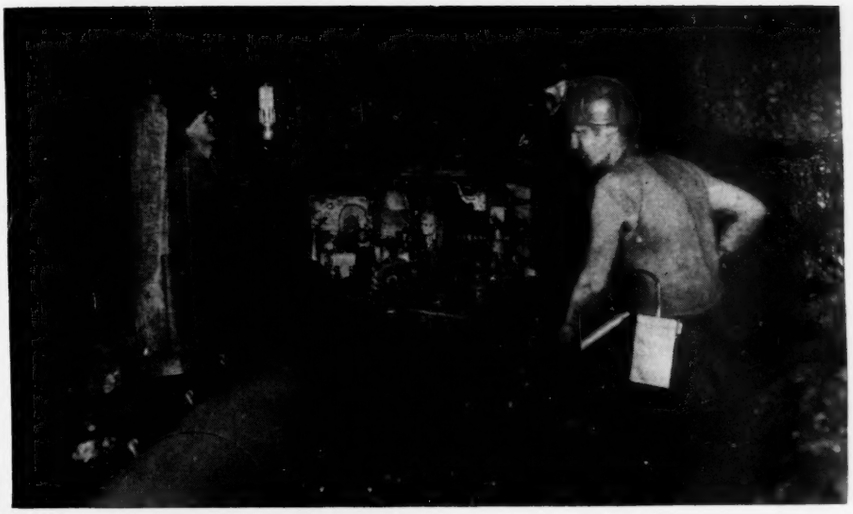
On Oct. 10, 1939, before the hole was opened, the volume at the downcast was 67,600 c.f.m. (barometer, 29.88). On Oct. 27, with the hole open and a barometer of 29.98, the volume was 79,300 c.f.m., an increase of 11,700 c.f.m. At another time, with the barometer at 30.74, the increase was 10,725 c.f.m. A slight gain was shown at the 11th and 12th East split after the regulator was opened, while in the intake ahead of the 17th and 18th East split, the volume was 22,000 c.f.m. with the hole closed and 31,600 c.f.m. with it opened, a gain of 9,600 c.f.m. Air going east with the hole closed was 12,000 c.f.m.; open, 15,000 c.f.m. Air going into the South and then into 17th West was 10,000 c.f.m. with the hole closed and 16,000 c.f.m. with it opened, an increase of 6,000 c.f.m. This latter air then is split between the main return and the drillhole. Air going up the hole varies from 8,000 to 12,000 c.f.m. and the water gage at this point, depending upon the position of the main-line locomotive and its direction of travel, varies from 1.5 to 2.4 in., compared with 4.5 in. at the main downcast.

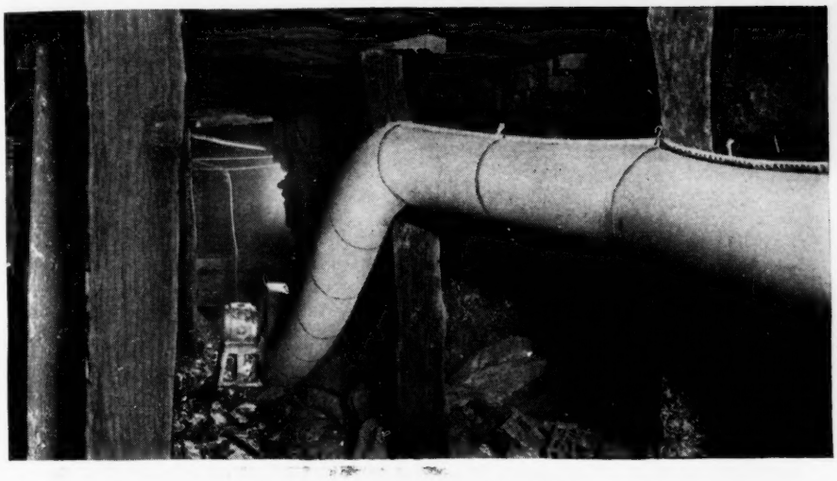
Fan Will Increase Air Flow

Installation of a suction fan at the hole will greatly increase the air flow, said Mr. Anstead, who also pointed out that holes up to 5 ft. are possible. "It also was recommended that we drill two holes, one in each entry, to be used as downcasts to ventilate the entire mine, using the hoisting and fan shafts as the upcasts. There are other advantages in this outlet: namely, that the men feel much safer with this added avenue of escape; also foul air is removed quickly. The hole also may be used as a downcast, supplying any section with pure fresh air. And, since booster fans are prohibited in Indiana, such an arrangement would be a decided advantage." Contract price for drilling was $6 per foot. Other costs brought the hole price up $7. Casing, concreting, etc., made the total about $16 per foot. The hole also would prove a great convenience in case it should be decided in the future to put down a shaft at this point.

A section foreman's conception of efficiency in mine operation was the subject of a paper by Harry Robertson, Dresser mine, Walter Bledsoe & Co., Terre Haute. Pointing out that in his county a development crew usually gets a section ready for the tonnage crew, Mr. Robertson stated that a new section should be driven in six room necks with three crosscuts: one at No. 1 room, one at No. 3 and one at No. 6. In most mines, a crew will skin up twelve or fourteen places, but in these twelve rooms at least fifteen places always should be available, including new crosscuts from one

No Mine Too Low!





No Entry Too Crooked

VENTUBE* is as flexible as a hose!

AND that's why you'll find this flexible ventilating duct in so many coal mines these days! "Ventube" makes it possible to ventilate low headings and speed up production with a minimum of expense. Brings you clean, fresh air with the aid of a fan of adequate capacity. "Ventube" is light weight and easy to handle—but strong enough to stand up under severe conditions encountered in mining low coal.

"Ventube" is made of extra-heavy, long-fibered, selected cotton cloth woven to high du Pont standards. Every thread that goes into this fabric is first chemically treated to prevent fungus growth. Then the pretested fabric is both coated and impregnated with rubber that won't peel off! "Ventube" resists acid water, damp, dry rot, fungus, mine gases and damage from concussion (because the fabric is made as strong in the warp direction as in the filler).

"Ventube" can go up and down steep inclines—turn sharp corners—go in and out of irregular passageways—and yet still keep a smooth interior for the unimpeded flow of fresh air. See for yourself how easily "Ventube" can be handled and how quickly it can clear the dust out of your deepest working. There's a "Ventube" distributor nearby who will be glad to show you.

Du Pont also makes a complete line of powder bags from the same sturdy material as is "Ventube." These bags are compact but roomy—and available in several serviceable sizes. Write du Pont for complete information.

*"Ventube" is du Pont's registered trademark for its flexible rubberized ventilating duct.

DU PONT VENTUBE

E. I. DU PONT DE NEMOURS & CO. (INC.)

"Fabrikoid" Division **Fairfield, Connecticut**

THE FLEXIBLE VENTILATING DUCT

room to the other. "Then your two headings and the new rooms you will be turning as you advance will give you eighteen places, and that generally is considered enough."

In the six rooms on each heading, two will be key rooms. In other words, as an example, No. 2 will be the key room for a group of three, Nos. 1 and 3 being picked up through the crosscuts from No. 2. "It is desirable to have at least one pick-up going at all times either to No. 1 or No. 3. There should be three pick-ups in each key room. This means that you will have to lay six switches in each key room before it is worked out. In my opinion, the extra coal far more than pays for the switches, besides the time saved in using the short car change when putting the loading machine in No. 2 switch off the entry."

In addition to the faces, there should be a new crosscut from the key room, making a total of four working places. When No. 3 is picked up, the track should be extended through to No. 4 and a back switch laid in No. 4. "When the loading machine goes into No. 5 he will load No. 6, then a new crosscut in No. 5, then No. 5 face and then No. 4, four in order, proceeding through the back switch into No. 3. Then he should have four or five places from Key Room No. 2. Using this method, he should load about ten places before coming back to the entry." A stub wire should be hung in each key room to relieve the loader operator of pulling his cable while taking the loader through the back switches.

Long Room, Less Narrow Work

"I prefer rooms driven 300 ft. deep," because after the place is in about 50 ft. the rest should be nicer loading because of the extra room for the loading-machine operators. Pick-ups should be started from the key room to divide the distance of the places. "You should never pull a car of coal over 100 ft. to switch it, and 50 ft. is much better." To do this, it is necessary to lay a switch each day, and "before a section foreman can do this he must have the switch and the necessary materials when needed."

Most mines have a powder station in a convenient place on each section. It is just as necessary that a similar place be prepared on each cross entry to place steel bars, also legs and road steel, with a box at each station to take care of all fishplates, bolts and spikes. "It should never be necessary for a section boss to have to order these supplies, as such places should be watched by the mine foreman or his assistant. There should be a right- and a left-hand switch on each entry at these storage stations. This would encourage the section foreman to lay more switches and have shorter hauls to switch coal."

The section foreman should mark every crosscut in a room on a timber and also number each crosscut in a room. Crosscuts should be placed every 30 ft. instead of every 45 ft., which would result in more tons per acre and make it easier to travel from one place to another. It also would shorten switching distances. Each working place should be examined with a safety lamp before the crew enters. When a place is skinned up, the section foreman should examine it, have it sighted and then mark it for cutting, keeping in mind the convenience of the loader operator.

"In the mine where I work, each time a place is loaded out we put up a 15-ft. 60-lb. bar flush against the face." This limits the face width to 18 ft. even with the maximum possible grip each way, and slows cutting when the machine is near the legs. Coal thickness is 4 ft., and therefore it is necessary to do considerable trimming of the top to get every possible half inch. The goal is a clearance of at least 38 in. over the rails. As the loading machines are 35 in. high, this gives a clearance of 3 in. in traveling. When the bars sag, however, it is necessary to change them.

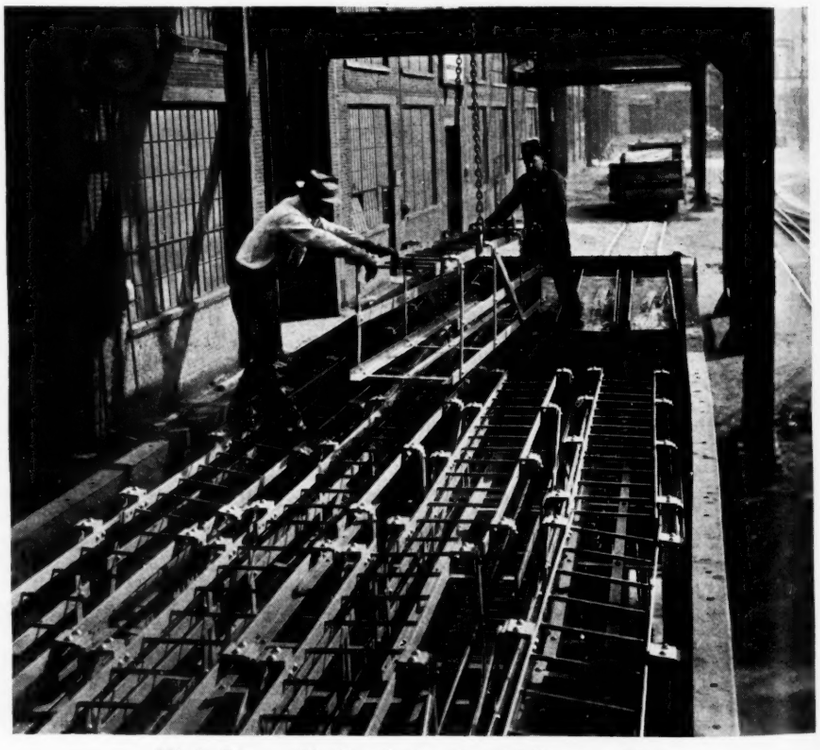
When a place is loaded out, a 10-ft.-long bar is set alongside the 15-ft. bar, after which the latter is dropped and moved ahead. But "instead of dropping this 15-ft. bar and doing double work to get one bar set it would be better to put the money in steel and use 15-ft. bars all the way." This would provide more room for the loader operator and triprider and the bars could be recovered when the room is worked out. But if long bars were used all the way, extra legs close to the track would be necessary at Dresser to prevent sagging, although these legs could be omitted in the cases of the three bars placed next to the face.

"I like to see a section foreman have a stamp on roof or timber about every 50 ft. in each room," with a stamp on the roof showing the center of every crosscut turned. The foreman should keep his crosscut data in a notebook so that when a room is skinned up he can check his crosscut without running around to make sure of his stamps. The two timbermen that follow the loader should be trained to sight up the room before starting to set timbers. This helps the tracklayer keep his track in line. "At our mine, it is best to lay the track to within 12 to 14 ft. of the face, so that after a place is shot down it can be loaded without putting down points." It also is desirable to have a man go ahead of the loader and shovel out from behind timbers and in front of the track to enable the loader operator, when he pulls into a place, to drop the head and start without delay. And when the machine gets to the face, there should be an empty car under the conveyor.

In most mines, regardless of the thickness of the coal, the loader will fill a car in about 1½ minutes. In high coal, the loader is proportionately larger and will fill a 5-ton car as quickly as the smaller machine will fill the smaller car. Cars should be switched in one minute or less to give the loader the chance it deserves. Small or large cars, about 150 should be loaded in seven hours.

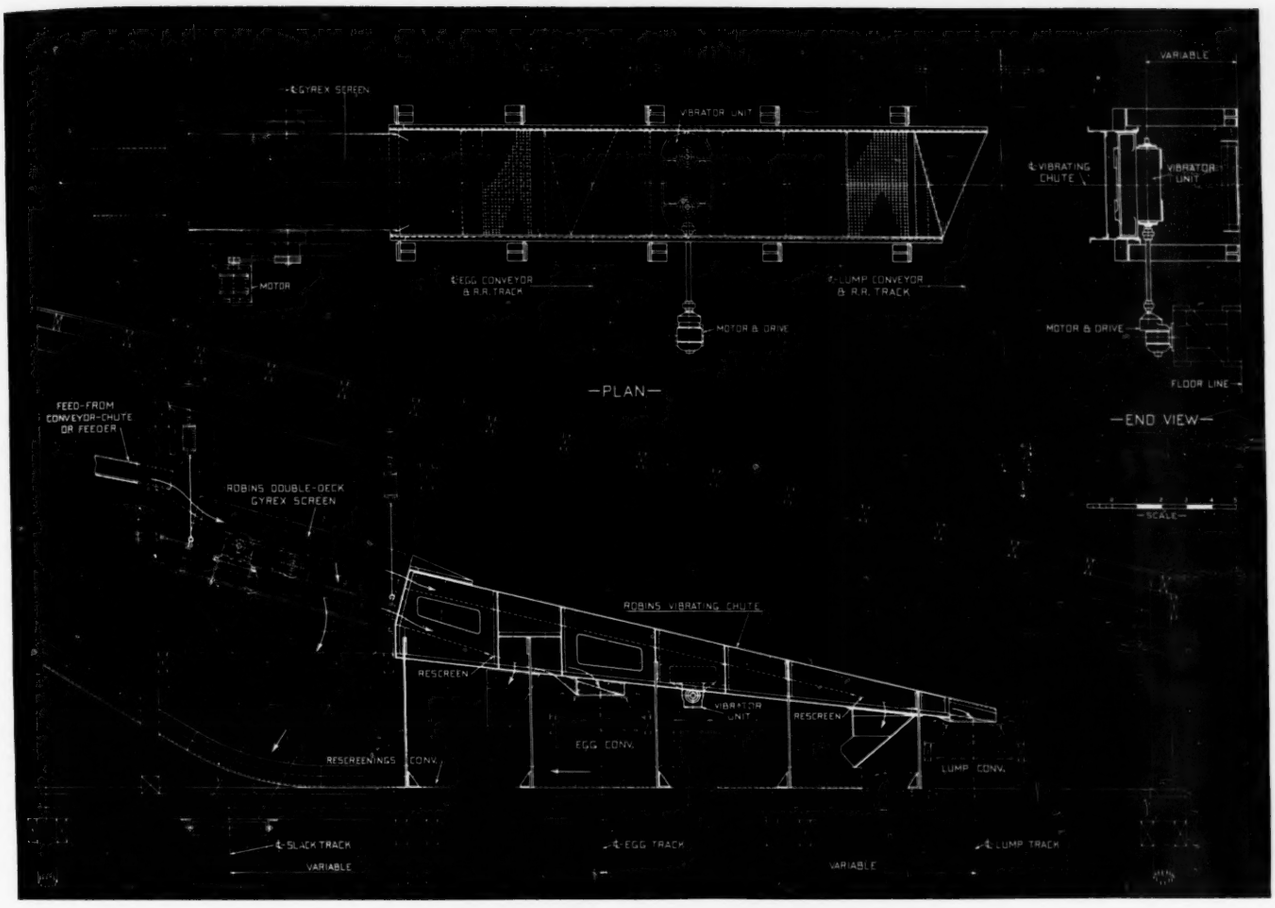
When a unit moves to another territory, the section foreman should receive a map. Before it is handed to him, a line should be drawn across it just past No. 6 room on each heading and he should be told always to load out the heading faces the first thing in the morning. The reason is that "most section foremen load coal like eating Christmas candy: they eat the best part first." The main reason, of course, for working in only twelve rooms is that when they are completed the material is available for the next twelve up the line. Thus the only new material required is that needed to take care of the headings.

"When using the Joy loader," said Mr. Robertson, "I don't believe in laying switches in the new rooms we turn while working the

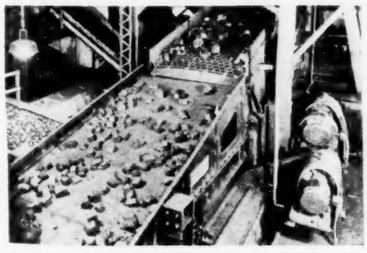


High-Strength Steel for Coal-Mine Ladders

Bethlehem Steel Co. loads about 750 ft. of safety ladders with landings, gratings and safety cages for ventilating shaft at its Marianna No. 58 mine, Ellsworth, Pa. To save weight and give long life these ladders were made of Mayari-R high-strength corrosion-resisting steel.



COAL PREPARED
ON-THE-MOVE
WITH ROBINS
VIBRATING TRANSFER CHUTE



The Chute has a slight slope and acts as a feeder. Available in single and multi-deck designs or with longitudinal divisions.

The motion of the Robins Vibrating Chute, imparted by the enclosed vibrator, moves the coal ahead so gently that it does not cause breakage of sound lumps. It provides an ideal method of transferring coal from screens to loading booms. While traveling, the coal may be cleaned by screen sections and hand picked without delay. Write for particulars.

ROBINS MAKES:

all types of Conveyors, Loading Booms, Bucket Elevators, Feeders, Crushers, Screens, Gates, Hoists and Grab Buckets.

ROBINS CONVEYING BELT CO.
15 PARK ROW, NEW YORK, N. Y.
Offices in principal cities

MATERIAL HANDLING ROBINS EQUIPMENT

old rooms out, due to the fact that we would have the switches tied up and maybe some of them torn up before we need them. Just about a week before the twelve rooms work out, start laying the switches in the new room necks and drive them in one or two more cuts so the cutting machine will have room to cut the places without blocking the headings. When the old rooms are worked out, pull the steel and put it in new storage stations farther up the same entry. Also, pull the switches on the entry and connect up the straight road. Leave the steel in the last room worked out on each heading so that the relay motor will have a place to put his empties."

Discussion following Mr. Robertson's presentation revolved about the number of cars a machine could get and the length of crossbars to be used in a place. D. W. Jones, superintendent, Princeton Mining Co., about summed up the car discussion with a statement that, with good top and the requisite number of switches, it was easy to get 150 cars a shift; with bad top, 110 tons would be an average figure. Participants in the crossbar discussion were unanimous in their preference for long bars, thus getting legs away from the track, although Mr. Robertson again stated that in his mine extra legs would have to be set to prevent sagging. And Mr. Cross pointed out that the 10-ft. bars used at Dresser were a heritage from hand-loading days, and discarding them would represent too great a loss of steel. About 2,000 such bars, he said, were taken out of one old section and were used up in 60 days.

Accompanying his remarks with step-by-step demonstrations, G. N. Kintz, mining engineer, U. S. Bureau of Mines, Dallas, Texas, wound up the technical sessions by explaining how fuel, air and heat enter into making a fire; best methods of handling inflammable liquids; best methods of fighting oil and other inflammable-liquid fires; and how explosions are initiated by gas ignitions caused by sparks or arcs from motors, starters, loose wires, overheating, etc.

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Macon Signs With U.M.W.

The Macon County Coal Co., Decatur, Ill., has signed an agreement with the United Mine Workers. The company had previously operated under a contract with the Progressive Mine Workers.

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Names N.C.A. Publicity Group

A committee to study an advertising program authorized by directors of the National Coal Association at its meeting in New York City on Oct. 26 has been named by President Dickinson, as follows: J. D. A. Morrow (chairman), president, Pittsburgh Coal Co.; Heath S. Clark, president, Rochester & Pittsburgh Coal Co.; J. D. Francis, president, Island Creek Coal Co.; Calvin Holmes, president, Holmes-Darst Coal Corporation; Fred S. McConnell, vice-president, Enos Coal Mining Co.; George W. Reed, vice-president, Peabody Coal Co.; and J. P. Williams, Jr., president, Koppers Coal Co.

The committee met in New York City on Dec. 7 and discussed similar campaigns by other industries in preparation for developing a program.

Committee Drafts Program For A.M.C. Convention

A well-rounded program calculated to intensify interest in the Seventeenth Annual Coal Convention and Exposition of the American Mining Congress, to be held in Cincinnati, Ohio, April 29-May 3, was drafted by the national program committee in Pittsburgh late in November.

Under the chairmanship of Harry M. Moses, president, H. C. Frick Coke Co., State and district chairmen considered specific subjects for discussion from the many suggestions made at earlier State and district meetings. Those present at the meeting included George F. Campbell, vice-president, Old Ben Coal Corporation, Illinois; A. R. Matthews, superintendent, Clover Splint Coal Co., Kentucky; E. A. Siemon, division general superintendent, Hillman Coal & Coke Co., Pennsylvania; J. J. Sellers, vice-president, Virginia Iron, Coal & Coke Co., Virginia; Whitney Warner, Jr., general manager, Camel Run mine, Warner Collieries Co., Ohio, and William J. Wolf, division manager, West Virginia division, Consolidation Coal Co. R. L. Ireland, Jr., president, Hanna Coal Co., is chairman of the Coal Division.

The exposition, which is sponsored by the Manufacturers' Division, of which Frank E. Mueller, vice-president, Roberts & Schaefer Co., is chairman, will feature all types of mining equipment, machinery and supplies used in modern coal mining.

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Coal-Stoker Cooperative Drive Rouses Public Interest

A striking instance of the power and effectiveness of joint effort and cooperative advertising by coal and stoker organizations was demonstrated in the promotion of the "Pot of Gold" model house with a modern stoker installation, in the south side of Chicago. More than 3,500 visitors went through this model house on the opening day, Sunday, Dec. 3, the crowds becoming so dense in the afternoon that it was necessary to lock the door until people inside the home had completed their inspection.

The Midwest Stoker Association, in cooperation with the Chicago Coal Merchants' Association, working through the office of the Committee of Ten, installed an automatic bin-feed stoker in a warm-air furnace and advertising was carried in Chicago's largest neighborhood newspaper. Direct-mail and other means of promotion also were used. The stoker was in actual operation. Many visitors said they were more impressed with the automatic coal-burning system than with any other feature of the house, and it kept two salesmen busy on the first day from morning until late at night explaining the operation of the stoker heating plant and its advantages.

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Anthracite Stabilization Plan Proposed by Dodson

A program to stabilize the anthracite mining industry of Pennsylvania has been proposed by Alan C. Dodson, president of the Anthracite Operators' Association, organization of independent producers (see *Coal Age*, October, 1939, p. 73, and December, p. 157). In a letter to James H. Pierce, president, East Bear Ridge Colliery Co., Mr. Dodson outlined his eleven-point plan in part as follows:

"My belief is that if we would stop quarreling about prices and production, and turn our thoughts and actions to broadening our markets and properly merchandising our coal, nine-tenths of our troubles would be over. With this in mind, I have been working along the following lines, with much of which you are familiar:

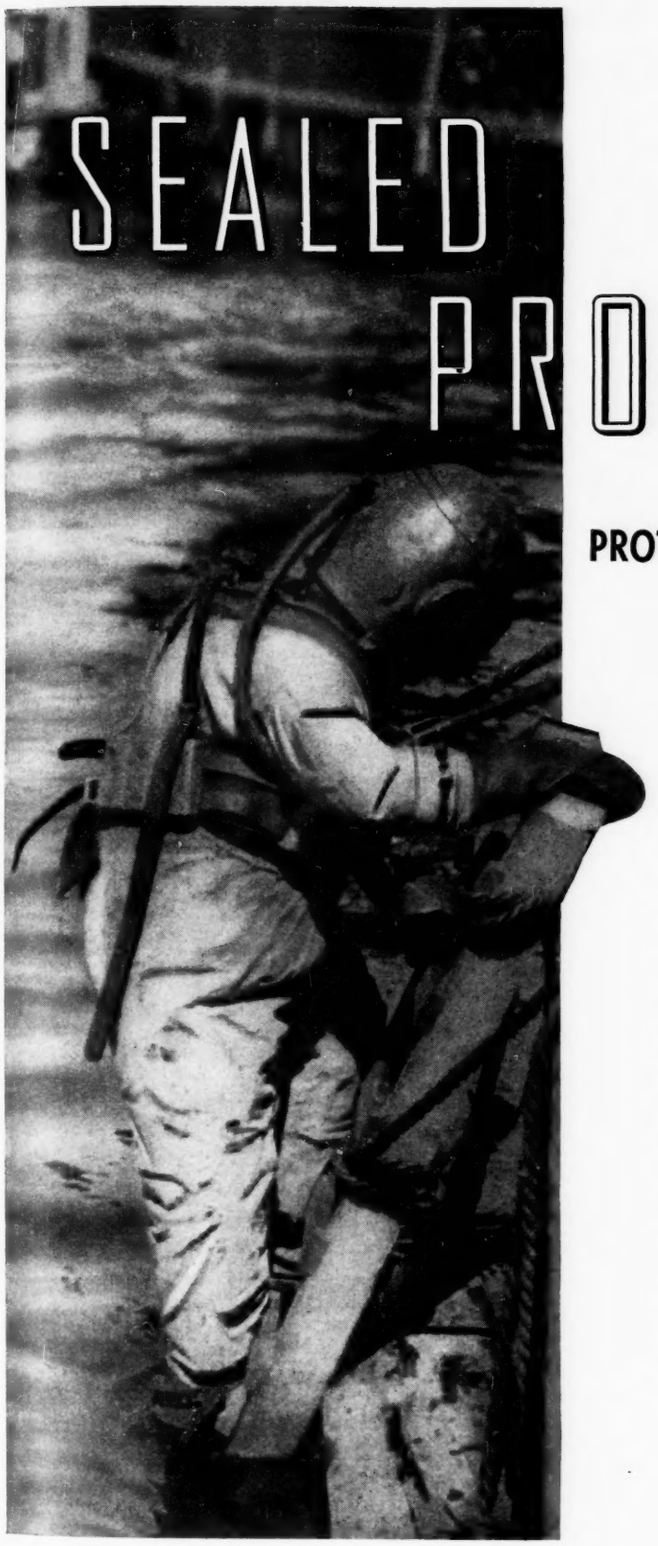
"1. Discontinuance of bootlegging and diversion of that market into legitimate channels.

"2. Continuance, with added effort, of the work of Anthracite Industries, Inc. After the recent shower of resolutions and letters from retail fuel dealers, it can no longer be said that the work of Anthracite Industries, Inc., has been a failure.

"3. Adoption of a code of fair practice in merchandising under the sponsorship of the Federal Trade Commission. Such codes can contain only rules and regulations promulgated by the Commission, and we can disprove the statement which is made by some that codes are harmful. Such statements are made only because of lack of knowledge of the manner in which the Commission operates. Only a few weeks ago the American Petroleum Institute, while condemning federal legislation to control oil, decided to apply for a code of fair practice.

"4. Divorcement of operating and sales companies from retail yards in Greater New York. Many feel that, second to bootlegging,

Public clamors to see model home with automatic heat.



PROTECTION

PROTECTS YOUR FUEL SALES . . .

PROTECTS CONSUMER . . .

PROTECTS YOUR FUEL . . .

Control dust . . . increase consumer acceptance . . . retain all the burning qualities of your fuels—spray them with COALKOTE's, "Sealed Protection".

"Sealed Protection" is the long lasting film that results when COALKOTE is sprayed on coal, coke or briquettes. It is the practical and economical method of sealing the dust to the large pieces of fuel and effectively controlling the dust.

Protect your fuel sales . . . protect your fuel . . . protect your customers against undesirable dust—with COALKOTE. Write for complete information on "Sealed Protection"—the modern dust-proofing treatment.

SUN OIL COMPANY

PHILADELPHIA, PA.

The Modern Methods To Dustproof Fuel

SUN OILS

"COALKOTE"

PETROLEUM PRODUCTS FOR ALL INDUSTRIES

this is the most malignant influence in anthracite. Whether it is or not, by divorcing the yards they would cease to be the heavy drain that they are on the profit and loss accounts of the companies that own them and they might become profitable; at least they would no longer disturb the metropolitan market as they now do and cease to furnish every chiseler, wholesaler, retailer or producer an excuse for carrying on his nefarious practices.

"5. Proper relations in the coal fields.

"6. Divorcement of the railroads and coal-mining companies.

"7. Grading and inspection of anthracite to prevent the poorest coal setting a price for the best, whether wholesale or retail, and to prevent cheating of the ultimate consumer.

"8. Exchange of tonnage for market in order to assist cooperating operators who are embarrassed by accumulation of one or more sizes from time to time.

"9. Encouragement of storing at the colliery sizes which are seasonally not in demand.

"10. Cooperative storage facilities in the field.

"11. Centralizing of sales effort and establishment of sales organizations similar to Appalachian Coals, Inc."

At a meeting attended by about half of the association's membership, held at the Hotel Sterling, Wilkes-Barre, late in November, almost unanimous belief was expressed that some form of voluntary regulation is necessary to correct overproduction and price demoralization.

•

Lower Costs Seen as Main Hope Of Coal Industry

Cost-cutting methods to reduce the price to the consumer must be pursued by the coal industry if it is to compete with hydro-electric power, gas and fuel oils, according to J. H. Edwards, associate editor of *Coal Age*, speaking Nov. 25 at a meeting of the Huntington (W. Va.) Chapter, American Association of Engineers. He suggested that this could be done by processing mine output to produce fuels of lower ash content and greater uniformity. Mechanical equipment and new processes are helping to insure a higher grade product, he added, leaving transportation as the chief problem of the industry.

In connection with the transportation angle, he noted that recourse was being taken to river transportation wherever possible and called attention to the heavy increase in motor-truck haulage from the mines.

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Deplores Russian Coal Inroads

New England receipts of Russian anthracite during the first ten months of 1939, which totaled 212,442 net tons, an increase of 29 per cent over the corresponding period of the preceding year, was characterized as "deplorable" by Louis C. Madeira 3d, executive director of the Anthracite Institute. "This competition displaced some 120,000 man-days of work in the ten months alone at our collieries," said Mr. Madeira, "to say nothing of incidental transportation and other labor."

Safety Viewpoint From Miner to Executive Given at Coal Mining Institute Meet

ATTACKING the problem of safety from the labor-relations viewpoint, and also methods of roof control, new certification laws, safety records, and trackless mining, the 53d annual meeting of the Coal Mining Institute of America, presided over by retiring president McKenna, took place Dec. 14 and 15 at the Fort Pitt Hotel, Pittsburgh, Pa. To insure a clear-cut picture, the miners' viewpoints as well as the operating personnel's, from foreman to executive, were included in the program. Formation of a committee to solicit funds for scholarships available to men of Pennsylvania, West Virginia and Ohio was sanctioned.

The principal speaker at the annual banquet, Heath S. Clark, president, Rochester & Pittsburgh Coal Co., gave, with W. L. Affelder, vice-president, Hillman Coal & Coke Co., toastmaster, the executive viewpoint toward safety and reminded the assembly that to be successful a safety program must not be on paper only. Also given was a State statistical release by J. I. Thomas, Secretary, Pennsylvania Department of Mines, who stated that for 11½ months of 1939 there were 193 fatalities (the lowest in 63 years), or 243,000 tons per fatality, in anthracite mining, and 115 fatalities (the lowest since 1889), or 758,000 tons per fatality (a figure never before reached), in bituminous mining.

Work performed by departments interested in safety, stated N. P. Rhinehart, Chief, West Virginia Department of Mines, is not yet fully standardized, and there is much to be learned before maximum safety can be achieved. Publicity and education are the necessary tools with which to lick accidents, as indicated by the history of mine explosions, which were of common occurrence until public opinion was aroused and the mine personnel became educated in the methods of eliminating the causes. Other types of accidents can be similarly reduced when the method of arousing public consciousness has been discovered, but cannot be done if records of individual cases are kept buried in files. Keep the policies, aspirations and fundamental rules of safety continually before those to be impressed, said Mr. Rhinehart. To gain interest and cooperation is largely a matter of salesmanship. Advertise! Create interest to overcome indifference and active opposition! Incorporate safety specifications as an integral part of the inspection service!

In West Virginia, he continued, specifications and recommendations are included in a small pamphlet given to each mine before inspection time. The inspector, upon examining a mine, then makes a red circle around each safety measure not adhered to and the book is hung in a prominent location where every mine official and worker may see the rating and thereby become familiar with the specific requirements for which they are responsible. Mine officials' daily reports, listing safety violations, will remind them of the responsibilities and also remove any plea of ignorance.

Education of Foremen Needed

Lack of knowledge is the usual reason for indifference, and desire for education is fostered not only by study for foreman's certificates but also by education in first-aid and mine rescue supplemented by short mining courses sponsored by State universities. State departments may compile information to supplement work of agencies already existent and disseminate such to ambitious workers. Sectional and local organizations are helpful, but, to be successful, must have some one in charge with initiative to promote and maintain interest in the meetings, which incentive State mining departments can inspire by systematically supplying information of current interest, stated Mr. Rhinehart. Monthly publications are extremely useful, but, besides safety, must also contain numerous items of interest to attract the reader. Bulletin boards can give a lot of publicity if properly used, and an avenue of information greatly neglected is the newspaper.

Act No. 135, passed by the General Assembly, approved April 29, 1937, and amended July 25, 1939, pointed out R. D. Joseph, State mine inspector, Johnstown, Pa., makes it obligatory that all persons employed as miners in the bituminous mines possess certificates of competency and qualifications. The law excepts those having fire-boss, assistant mine foreman and mine-foreman certificates and supervisory and technically trained employees whose work contributes only indirectly to mine operations. It further provides for employment of apprentice miners when working with certified miners. Examination duties have been outlined to the various district mine-foreman examining boards before which the appli-

1940 OFFICERS-ELECT

Newell G. Alford, consulting engineer, Pittsburgh, Pa., was elected president of the Coal Mining Institute of America at the 53d annual meeting, in Pittsburgh, Dec. 14 and 15. E. A. Siemon, division general superintendent, Hillman Coal & Coke Co., Pittsburgh, is first vice-president; J. J. Forbes, supervising engineer, Safety Division, U. S. Bureau of Mines, Pittsburgh, is second vice-president; and F. W. Howarth, State mine inspector, Republic, Pa., is third vice-president.

Managing directors are: F. E. Bedale, assistant to general manager, Consolidation Coal Co., Fairmont, W. Va.; J. M. Connor, manager of mines, West Pennsylvania Power Co., Pittsburgh; G. H. Dodge, safety engineer, Buckeye Coal Co., Nemacolin, Pa.; J. B. McKenna, chief mine inspector, Pittsburgh Coal Co., Pittsburgh; and G. J. Steinheiser, State mine inspector, Indiana, Pa., to serve for two years; L. C. Campbell, assistant to vice-president, Koppers Coal Co., Pittsburgh; M. L. Coulter, safety engineer, Clearfield Bituminous Coal Corporation, Indiana, Pa.; E. A. Holbrook, dean of engineering, University of Pittsburgh, Pittsburgh; and W. P. Vance, general superintendent, Butler Consolidated Coal Co., Wildwood, Pa., for one year.

Official business

H. G. Conrad, general manager, Knox Consolidated Coal Corporation, and retiring president, looks over the agenda with Harvey Cartwright, institute secretary.

Idea exchange

D. W. Jones and James Guiney, Princeton Mining Co., take part in a round-table discussion, while Fred Bieler, Snow Hill mine manager, makes his point in the background.

Proving it does

G. N. Kintz, U. S. Bureau of Mines, with the help of R. D. Leitch, sets up the gas chamber to show that open equipment will ignite gas.

Merit rewarded

R. A. Templeton (right), vice-president, Glendora Coal Co., and new institute president, accepts the John A. Templeton safety trophy in behalf of the men at Baker mine.

His heart's in Indiana

V. A. ("Big") Richardson off on a tour of poetry, humor and philosophy at the banquet meeting.

Long story

Thomas James and Emory Weaver, Knox Consolidated Coal Corporation, wait for Walter Buss to reach his conclusions.

Pays with a smile

P. L. Donie, Little Betty Mining Corporation, settles the dues question with Miss Ethel Morgan, secretary to the commissioner, Indiana Coal Operators' Association.

Awaiting the bell

Harry Robertson, John Hill Jr. and Leonard Busiere, all from Dresser mine, Walter Bledsoe & Co., relax before the meeting.

cant must appear in person, or the inspector, if the board is not in session. Qualifications and requirements are: (1) that applicant be at least eighteen years old; (2) have two years' practical experience in the bituminous mines of Pennsylvania; (3) speak intelligently the English language; (4) submit proof of experience; and (5) correctly answer eight questions based on practical knowledge.

Examination for certification of shotfirers and machine runners in gaseous bituminous mines was provided for in Act No. 431 of the Bituminous Mining Law, approved June 25, 1937, which became effective June 25, 1938. Commencing Oct. 1, 1939, the manner of determining competency for shotfirers must be in accordance with rules as prescribed by the Secretary of Mines, said E. W. Wilkinson, State mine inspector, Shamokin, Pa. He told how all applicants must be examined by the mine foreman's examining board of each bituminous district at its regular semi-annual meetings, must be 23 years old, have had at least two years' experience in gaseous bituminous mines, be able to read and write the English language and possess a miner's certificate. Examinations shall be oral and, besides answering questions, the applicant must demonstrate ability to determine the presence or absence of explosive gas by use of an approved flame safety lamp.

What Machine Runner Must Know

A machine runner, to receive a certificate of competency, in the opinion of W. P. Powers, State mine inspector, Pittsburgh, must possess the following qualifications: (1) have ample experience as a mining-machine scraper and some familiarity with operating the machine; (2) have knowledge of the principle of the flame safety lamp, properly assembling it, and determining the presence of explosive gas with same; and (3) be familiar with rules 69 and 71 to 76 inclusive of Art. XI of the mining laws and also with treatment of electric shock as provided in Rule 13.

With the rapid development of mechanization during the past fifteen years, the pace set has been so accelerated that the industry was largely unprepared to meet the radical changes in so far as trained electrical personnel were concerned, stated J. F. Conrad, State mine inspector, Ebensburg, Pa. With this in mind, he continued, the Department of Mines asked for a law requiring the certification of chief mine electricians, and Act. No. 430 was approved June 25, 1937. This act provides that, commencing two years after the effective date, it shall be unlawful to employ as chief mine electrician in any gaseous bituminous coal mine using approved electrical equipment any person who has not demonstrated to the satisfaction of the examining board his fitness and competency to examine and maintain in a safe condition such electrical equipment, and also his general knowledge of the installation and use of electricity and the dangers incident to its use in coal mines. Under Sec. 2 this act further provides that it shall be the duty of the mine electrician to assist the mine foreman in carrying out all the provisions of the bituminous mining laws bearing on the use and installation of electricity in bituminous mines and the equipment powered thereby, and that he shall be subject to the same penalties as the mine foreman for violation of these laws. It also was ruled that the mine electrician may have any number of subordinates, who need not necessarily be certified.

Why electric cap lamps cannot be used by shotfirers under the law was questioned. Mr. Wilkinson thought the law was a throwback from the time when blasting caps and cap lamps were of poor construction and use of the lamps might prematurely set off a charge. Richard Maize, State mine inspector, Uniontown, Pa., felt the same as Mr. Wilkinson and would amend the law to permit use of an electric lamp that would remain lighted only when finger pressure was applied, such as a permissible flashlight. By having but one lamp (a safety lamp) the fireboss cannot neglect it, so the law is a good one and should not be changed, opined Frank Dunbar, general manager, Mather Collieries, Mather, Pa.

Keeping Step With Coal Demand

Bituminous Coal Stocks

(Thousands of Net Tons)

	Nov. 1 1939	Oct. 1 1939*	Nov. 1 1938
Electric power utilities	8,380	7,923	8,195
Byproduct coke ovens	7,250	6,220	6,459
Steel and rolling mills	642	573	620
Railroads (Class 1)	5,032	4,338	5,052
Other industrials†	12,865	11,189	10,998
Total	34,169	30,243	31,324

Bituminous Coal Consumption

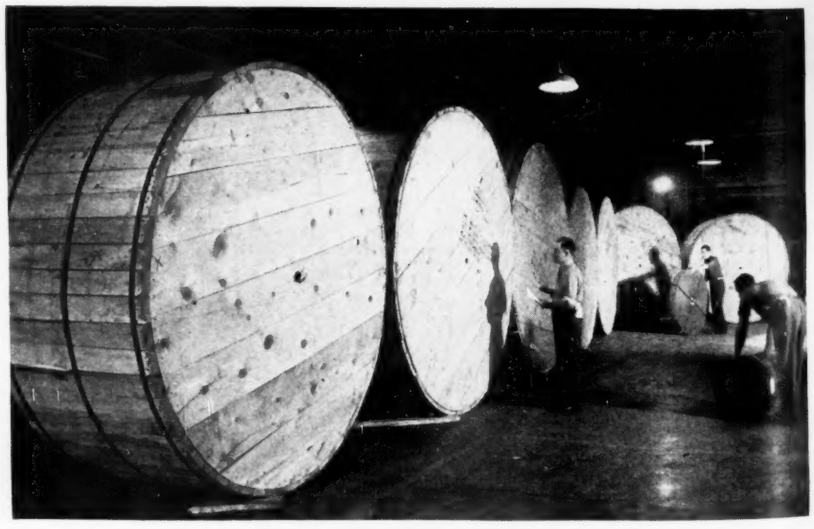
(Thousands of Net Tons)

	Oct. 1939	Sept. 1939*	Oct. 1938
Electric power utilities	4,470	4,025	3,575
Byproduct coke ovens	6,400	5,517	4,360
Steel and rolling mills	979	766	736
Railroads (Class 1)	7,459	6,492	6,663
Other industrials†	10,183	8,180	8,400
Total	29,491	24,980	23,734

* Revised. † Includes beehive ovens, coal-gas retorts and cement mills.

Records that should be maintained by mining companies for use in safety work were presented in a session under the chairmanship of C. H. Maize, mine inspector, Northwestern Mining & Exchange Co., DuBois, Pa. With the declaration and enforcement of a definite safety program, said C. H. Dodge, safety engineer, Buckeye Coal Co., Nemacolin, Pa., there arises the need for regular and frequent checks on the individual and group progress in every section and department. Personal and statistical safety records should be kept and, through experimentation and changing conditions, new records incorporated, with consequent deletion of old ones. At Nemacolin each employee keeps an individual record card on his person, and when a safety rule is violated the foreman takes up the card and gives the careless worker a new one. The foreman signs the old card, indicates the infraction and gives it to the department head, who takes any necessary action. Each six months a summary of cards is given the superintendent or other official concerned. Each worker punches his time-clock card every day to indicate whether or not he had an accident, and if so, is not permitted to return to work until released by the doctor. Foremen's individual and comparison progress charts are posted each month, and awards made to give an added incentive to the competitive spirit.

It has been estimated that at present-day wages each employee represents an investment of $25,000 to the company by which he is employed, and W. L. Walker, safety engineer, Butler Consolidated Coal Co., Wildwood, Pa., thought the first purpose of any record should be to show facts that would indicate the best manner in which to protect and preserve intact that investment. Therefore, every effort should be made to prevent clouding the situation, and the first step is to have a qualified person in charge of the records. The second step is to decide what general facts are desired from the tabulation and the best method



Three-Mile Belt for Submarine Coal Mine

Designed for use in the Lota i Coronel coal mine, under the Pacific Ocean near Coronel, Chile, 1,000 ft. under the surface and two miles from the shore line, is the conveyor belt manufactured by the B. F. Goodrich Co., Akron, Ohio, part of which is shown in these packages. The belt totals 18,000 ft. in length, weighs more than 100 tons, and will be installed on an American conveyor system which handles more than 300 tons of coal per hour.

TO ASSURE MAXIMUM SAFETY

When utmost wire rope safety is essential — to protect lives, loads, or equipment — or to provide an extra safeguard against the pounding, the wear and tear, of rough service — Roebling "Blue Center" Wire Rope meets the exacting requirements.

The highest development in Roebling Wire Rope, "Blue Center" provides maximum resistance against wear and fatigue — assures maximum rope life and safety. **And safety means economy in the long run.**

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STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

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of itemizing them. Record of the individual, of each foreman, and of the company as a whole should be included. Tabulations should be such as to permit comparison with other companies and adaptation to State and federal classifications.

To answer what records should be kept by mining companies for use in safety work, Carl A. Peterson said we must ask and answer two other questions: (1) "What function can records perform for us?"—they can provide information enabling us to apply our efforts intelligently to prevent accidents, and also act as morale builders by fostering competition. (2) "What information do we need to guide our accident-prevention efforts?"—complete information about every factor that may have had a part in causing the accident is needed. There are in any accident two essential elements: "the man and his physical environment." Therefore, two types of records are needed, one of the individual and place, and another of accident causes connected with each.

Records and statistics can be of great help in reducing accidents, said Mr. Maize; however, statistics can often cause wrong impressions and decisions if used incorrectly. For example: Last year it was found that most accidents took place on Tuesday; should the mine be closed on that day? When intelligent interpretation is applied, information of value may be obtained as shown: in 1937 it was found that 2.6 per cent of all accidents were by cutters, and in 1938, 7.3 per cent. These figures were brought to their attention at group meeting in an effort to reduce the rate.

Roof Troubles in Thin Pittsburgh

Roof control in the thin part of the Pittsburgh seam is much more troublesome than in the thicker areas, and it is a well-known fact, stated R. H. Nicholas, mine inspector, Pittsburgh Coal Co., Allenport, Pa., that the thinner areas have many more clay veins, roof slips and horsebacks, which are of constant worry and require more and closer timbering. Mobile loading machines are in use and require free space in which to operate, so our efforts are being concentrated toward fitting timbering plans and mining methods to the machine. New timbering methods are constantly being tried, for any system of mining is only as good as the degree of roof control obtained. It is realized that "even though roof conditions are very bad, mechanical mining of coal is here to stay, and the sooner everyone makes up his mind to that effect the better off we will all be."

Several methods of roof control, continued Mr. Nicholas, are in use at our mines, each one developed to suit prevailing local conditions. The oldest and most simple system (in use where there are few clay veins, roof slips, and a regular roof) consists of straight road and gob posts with temporary posts in the face area which can be shifted around as the coal is loaded out. Other variations of post setting have been in use and led to a method whereby two 4-in. aluminum H-beams are placed across the room parallel to the face, one beam 3 ft. from the face and the other 6 ft. from it, which remain until the cut is loaded out. Posts support the ends of the beams and screw jacks in the middle are shifted around as the machine loads across the face. Permanent posts are then set before the beams are moved. With rooms 26 ft. wide, 300 ft. deep, 3-ft. drawslate to be held, and the coal loaded onto chain conveyors, the following system has been developed. Nine steel beams, parallel to face, on 3-ft. centers, support the slate in the face area. The steel beams, instead of being 26 ft. long, are in two lengths of 13 ft. each, and a sleeve (to make easy handling) is used to connect them. They are supported by two screw jacks, one at each end, which have U-shaped heads to prevent the beam from rolling, and two center jacks on either side of the sleeve at reinforced jacking points. While the coal is being loaded the newly exposed slate is supported by screw jacks until steel beams can be moved into place. Before removing a steel beam, permanent wood timbers 4x6 in.x16 ft. are set to control the roof over the pan line and the loading-machine tramway, and are supported by three wood posts on 5- and 9-ft. centers. The rest of the drawslate area is supported by a sufficient number of straight posts.

The width of opening, kind of roof and floor material, seam thickness, width of pillars and location of room conveyors, stated C. P. Brinton, chief engineer, Barnes & Tucker Coal Co., Barnesboro, Pa., governs the system of face timbering. Before timbering, he continued, a study of roof texture should be made and used as a basis of judgment. At Barnesboro mine, diamond drill-holes show kind of overlying strata, and by careful study roof conditions in virgin territory are determined and room centers and widths established accordingly.

Methods of loading, gathering, and transportation of coal differing from the conventional, studied by the Coal Mining Section, Mining Division, Bureau of Mines, were described by Albert L. Toenges, supervising engineer, Pittsburgh. A drift mine having 49-in. seam, hand-loading and conveyor transportation from face to tipple, produces 400 tons per day in two seven-hour shifts. An average of 11 tons of coal is produced per prop used, and 10.8 tons per pound of explosive. Average tons per day per man employed (total men, surface and underground) is 8.3 and total power consumed is 2.7 kw.-hr. per ton.

Another example of continuous flow of coal by conveyors to tipple, but using mobile loaders, is a drift mine having a 42-in. seam and producing 500 tons per day in two seven-hour shifts. Approximately 12.5 tons is loaded per prop used and 2.4 tons per pound of carbon-dioxide explosive. Average tons per day per man employed (total men, surface and underground) is 8.8 and total power consumed is 2.8 kw.-hr. per ton.

Rubber-tired tractor-trailer units for gathering (except in development headings), rail haulage for main line, and belt from shaft bottom dump to tipple, make up the transportation system at another mine. Seam is comparatively level, 6 ft. in thickness, with 3- to 4-ft. clay bottom underlaid by thick sandstone, Mr. Toenges continued. Two loadings machines work in panels and rooms and load directly into the trailer units, which haul 1,000 ft. to a transfer station. Approximately 30 tons of coal is produced per prop and 5.3 tons per pound of permissible explosive. Average tons per day per man employed (total men, surface and underground) is 17.60 and total power consumed is 6.5 to 7.3 kw.-hr. per ton.

Management can do a great deal to increase the efficiency of the worker, stated W. P. Vance, general superintendent, Butler Consolidated Coal Co., chairman of the session involving problems in maintenance, training of personnel, and general safety practices in the operation of mechanical mining equipment. Sincere cooperation and the use of the proper philosophy are necessary, for it must be remembered the miner is working for a living and needs an incentive in order to do good work. Labor is the most essential part of mining and labor should be "sold" on the necessity of cooperation, thereby developing respect and confidence of both labor and management. It is known that mechanized mining requires a high type of man who can and does understand, but what do the operators do to sell him on cooperation? "Let's sell him on the point that the work he does is desirable and show him the fallacy of the relief idea. This country was founded by, and grew through, the efforts of working men. Are we going to let this relief idea creep in? We have talked in the past; now, why not sell the work idea ourselves?"

Bad Repair, Not Bad Machines

In the past, most criticism of mechanical equipment was due to poor maintenance, said A. L. Barrett, maintenance engineer, Pittsburgh Coal Co., rather than to the actual inability of the machine to do the job. Frequently, too, failure of the machine is the result of improper operating conditions, such as poor track, lack of bonds, feeders, etc. Maintenance men should have a good educational background covering simpler mathematics, mechanics and electrical fundamentals. Maintenance crews and work should be well organized, records kept, and spare equipment in readiness for breakdowns.

"Never in our industrial history has management been faced with so many perplexing problems," G. H. McLellan, safety engineer, Weirton Coal Co., Isabella, Pa., brought out. Never has there been a greater need for understanding between employee and manager with respect to the problems which affect their mutual interests. In mechanized mining, labor relations are one of the biggest problems, and anything done to improve them is well worth while. Accident prevention offers to management and worker an

"When It's Red, It's Reading"

The Philadelphia & Reading Coal & Iron Co., Philadelphia, Pa., has adopted a red trademark to identify its anthracite and has launched a radio program to publicize its product. In addition it is contemplating an extensive newspaper advertising campaign in the United States and Canada with the slogan "When it's red, it's Reading." According to Joseph T. Berta, general sales manager for the company, the scheme is the result of eleven years of research and experiment. "The red spots," he says, "will not wash off; they will not stain customers' bins and they will not detract from the burning quality of the coal."

opportunity to lay the foundation upon which can be built, and have been built, understanding, confidence and cooperation. Training results in efficiency of operation, which means a safe job, and the goal is to make thinking instead of manual operation a habit.

"Securing maximum cooperation of workers in the safe operation of our coal mines presents probably the greatest challenge to the capability and personality of the mine officials," said George Struble, mine foreman, Buckeye Coal Co., Nemacolin. A sufficient number of assistant mine foremen are necessary for good supervision and efficient operation, and workers realize the false economy of inadequate supervision, but naturally cannot cooperate and work with the same incentive as when properly safeguarded. The majority of man-power is mine labor and therefore their suggestions should be given consideration in the safety program so that they will cooperate in every way. Without this consideration they will resist the rules and consider them a penalty. Mine officials should mingle with the men and encourage them, and they in turn, seeing the interest taken, will return the gesture with confidence and do all in their power to help the official, said Mr. Struble.

How Commodore Cut Accidents

"A great reduction in accidents has taken place at the Commodore mine," stated George Cunliffe, miner, past president, local Holmes Chapter and local union, "which was brought about by: (1) the system of timbering developed, (2) cooperation between men and officials, and (3) compliance with the mine rules and State mining law. The monthly meeting of the Holmes Safety chapter also has been a main factor in accident reduction because at these meetings all accidents are discussed and also ways and means of preventing their recurrence. Officials should greet a miner in a friendly way, and the miner should pay strict attention to the orders and obey them at once."

The mine worker is intensely interested in the safety movement, Mike Pasternick, miner, president, local union, Kent, pointed out, because after all, he and his family are the ones who suffer most when an accident occurs. The establishment of Holmes Safety Chapter Kent No. 4 has been the greatest factor in reducing accidents, for in 1937 the accident frequency rate was 138.98, compared with 14.28 in the first nine months of 1939. The record was accomplished with only a few penalties, showing that the officials have been instructors to employees and have given them a chance to learn instead of penalizing and causing hard feelings. "This method of supervision has helped along the line of sincere cooperation between officials and miners," stated Mr. Pasternick.

Methods which may be used by a State mine inspector to promote safety were given by G. J. Steinheiser, State mine inspector, Indiana, Pa. The establishment of Holmes chapters in Indiana county and the miner-operator cooperation as expressed by the preceding papers are a direct result of his unfailing efforts.

"Will increased supervision assist in accident prevention?" inquired D. J. Keenan, State mine inspector, Barnesboro, chairman of this session, and pointed out cases under his observation where such was the case.

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in November, as follows:

Joy Mfg. Co.: Type PL8-4P elevating conveyor; 7½-hp. motor, 250-500 volts, d.c.; Approvals 385 and 385A; Nov. 4.

Ingersoll-Rand Co.: Type 50 Model 120 air compressor; 35-hp. motor, 250 volts, d.c.; Approval 386; Nov. 25.

National Carbon Co., Inc.: Eveready No. X-247 ten-shot dry-cell blasting unit; Approval 1601; Nov. 7.

When considering the problem of increased supervision, H. E. Roberts, chief engineer, Monroe Coal Mining Co., inquired: "(1) Just how far should an increase of supervision go, and (2) how many visits to an employee per shift will assure his remaining accident-free?" It is possible that accidents can be largely diminished by such means as proper instruction rather than through increased supervision. A higher type of labor is coming into the mines, who are intelligent and can be taught the correct, safe way to work, and mutual respect and trust between employer and employee and proper education will reduce accident rates with little supervision.

A supervisor, explained W. E. Ray, safety inspector, Koppers Coal Co., must have good visual powers, must be familiar with all the phases of mining, and should be a diplomat and a teacher with sufficient firmness and fairness to impress all employees.

Beginning Jan. 1, 1937, stated D. C. Davidson, general superintendent, Peale, Peacock & Kerr, St. Benedict, Pa., a careful study to devise ways of reducing accidents was made, with the decision to experiment by increasing the supervisory force at one mine, and to make it a yardstick for judging the others. Cost of the increased supervision amounted to $8,000 per year, but by Oct. 31, 1939, cost of accidents had been reduced about 52 per cent, although working under the new compensation law of January, 1938. By extending the double-inspection system to a second mine, the first year of experimentation decreased cost of accidents 54 per cent and number of accidents 55 per cent.

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New Preparation Facilities

Hammond Coal Co., Hammond breaker, Girardville, Pa.: Contract closed with Wilmot Engineering Co. for installation of 13½-ft. Chance cone to clean all sizes from nut to egg and/or broken; capacity, 145 tons per hour of cleaned output; average of 220 tons per hour will be sent for cleaning.

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Government Contract Procedure

A booklet that should interest persons supplying goods or services to the United States Government, entitled "Matters of Procedure Under Government Contracts," has been issued by the Fidelity & Deposit Co. of Maryland, Baltimore. This is a new

edition revised to date, containing not only the material covered in the title but also including references to important statutes and court decisions applicable to contracts with the Government. Copies may be obtained without charge from the company or its subsidiary, the American Bonding Company of Baltimore.

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Personal Notes

GORDON C. COOKE, vice-president and secretary of the Delaware, Lackawanna & Western Coal Co., New York City, has been elected president and a director of the company. He succeeds the late Harry A. Smith. Mr. Cooke joined the company in 1924 as auditor and was elected secretary in 1927 and vice-president in 1937.

A. F. DIAMOND, division superintendent, Davis Coal & Coke Co., was elected president of the Preston County Coal Mining Institute at the annual meeting. Other officers named are: vice-presidents, N. W. MONTGOMERY, superintendent, Hillman Coal & Coke Co.; P. E. MCKINNEY, superintendent, Preston County Coke Co.; S. B. JEFFRIES, superintendent, Masteller Coal Co.; HAROLD REAM, general manager, Stanley Coal Co.; F. W. CUPP, superintendent, Cumberland Coal Co.; SENATOR A. L. HELMICK, manager, Blackwater Coal Co., and WILLIAM MOORE, inspector at large, West Virginia Department of Mines; secretary-treasurer, H. B. WICKEY, preparation and safety engineer, Davis Coal & Coke Co.

R. L. FORNEY, assistant to the managing director of the National Safety Council, has been appointed director of the council's Industrial Division, effective Jan. 1. Joining the council as a safety engineer, he served 2½ years as business manager, and for the last sixteen years has been chief engineer and director of the Statistical Division. He succeeds W. DEAN KEEFER, who ended 21 years with the council to join the Lumbermen's Mutual Casualty Co.

J. W. GARVEY, general manager, Maryland-New River Coal Co., was elected president of the New River Coal Operators' Association at its annual meeting. Other officers chosen are: vice-president, EBERSOLE GAINES, president, New River Co.; treasurer, P. M. SNYDER, Koppers Coal Co.; secretary-traffic manager, S. C. HIGGINS.

T. J. O'BRIEN, vice-president, Gunn-Quealy Coal Co., was reelected president of the Southern Wyoming Coal Operators' Association at its adjourned annual meeting. Other officers named are: vice-president, W. J. THOMPSON, president, Colony Coal Co.; secretary-treasurer, L. W. MITCHELL.

OSCAR F. OSTBY has returned to the Electric Furnace-Man, Inc., as vice-president in charge of sales. He resigned from this position in 1936 to become president of Independent Anthracite Coals, Inc., a sales agency in Wilkes-Barre, Pa. A year later he was appointed director of markets for the Stevens Coal Co., Shamokin, Pa. Late in 1938 he was appointed assistant to the president of Anthracite Industries, Inc.

M. F. PELTIER, vice-president, Peabody

Coal Co., has been reelected president of the Illinois Coal Operators' Association. FRED S. WILKEY also has been renamed secretary. The new executive board is composed of the following: D. W. BUCHANAN, president, Old Ben Coal Corporation; G. B. HARRINGTON, president, Chicago, Wilmington & Franklin Coal Co.; H. E. HOWARD, president, Binkley Mining Co.; T. C. MULLINS, vice-president, Southwestern Illinois Coal Corporation; T. J. THOMAS, president, Valier Coal Co.; W. P. YOUNG, vice-president, Bell & Zoller Coal & Mining Co., with Mr. Peltier chairman.

CHARLES REDNOUR has been appointed mine manager for the new slope mine of the Moffat Coal Co. at Sparta, Ill.

GRANT STAUFFER, JR., president, Hume-Sinclair Coal Mining Co. and the Huntsville Sinclair Mining Co., has been unanimously elected president of the Chamber of Commerce of Kansas City, Mo.

ELDO TAYLOR, formerly storekeeper for Mine No. 7 of the Franklin County Coal Corporation, has been made chief storekeeper for the company, with headquarters at Mine No. 5, Herrin, Ill.

M. L. WORKMAN, formerly superintendent at Beards Fork mine of the Koppers Coal Co., Beards Fork, W. Va., has been made assistant division superintendent of the Powellton Division.

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Saskatchewan Strike Settlement Bans Unions During War

After nearly seven weeks of negotiations, a strike in the Estevan coal fields of Saskatchewan, Canada, was settled on Dec. 8. The strike, which involved about 500 workers, began Oct. 23 when operators refused to recognize either the United Mine Workers or the Canadian Federation of Labor as representing the men.

The agreement provides for: (1) withdrawal of both the U.M.W. and the C.F.L. from the field for the duration of the war and one year thereafter; (2) establishment of a new organization to safeguard the interests of the miners, both unions to assist in setting up such a body; (3) recognition of the basic minimum of 40c. an hour for common labor; (4) recognition of the principle of collective bargaining, closed shop, seniority lists, and schedules of wages based upon the basic minimum; (5) the contract now in operation at the stripping operation of the Western Dominion Coal Mines, Ltd., to remain in force, and negotiation of other contracts to be made on a similar basis. A committee of three, including one each by the U.M.W., C.F.L. and the Sasketchewan Government, is to be appointed to assist in setting up the new organization.

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Premier Pocahontas Sold

A controlling stock interest in the Premier Pocahontas Collieries Co., Premier, W. Va., has been acquired by Laurence E. Tierney, Jr., and Lewis C. Tierney and associates and general offices of the company will be moved to Bluefield, W. Va. The company, which started operations in 1909, has heretofore been headed by Green Nowlin, Jr. The new owners also control the Eastern Coal Corporation and Tierney Mining Co., both operating in Pike County, Kentucky.

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Attacks Attempt to Revive St. Lawrence Project

Attempts to revive the St. Lawrence seaway project were roundly scored by John D. Battle, executive secretary, National Coal Association, on Nov. 28. Characterizing the scheme as a "glittering and costly gold brick," Mr. Battle said: "Changing the title and emphasis from sea-way and navigation and the Western farmer to hydro-electric power and Eastern industry does not alter the essential considerations. The attempt to wrap this defeated and discredited billion-dollar bubble in the mantle of national defense is unworthy and we are confident will be unavailing when it reaches the United States Senate.

"One basic and fundamental objection from which there is no escape and no palliation is that the St. Lawrence-Niagara hydro power project as now sought by the New York State Power Authority and indorsed by members of the New Deal's National Power Policy Committee will preempt the market for 7,000,000 tons of bituminous coal per annum. It will do this in the face of the fact that the electric power which will flow from the project could be more economically produced in coal-burning steam plants if this additional power be in fact requisite—either for industry, national defense or for competitive crack-down by public power agencies upon private power agencies."

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Air Cleaners Licensed

Fairmont Machinery Co., Fairmont, W. Va., and Link-Belt Co., Chicago, announce that they have been licensed by Peale-Davis Co., St. Benedict, Pa., under the Peale-Davis process patents covering the air-cleaning of coal. They further state that the American Coal Cleaning Corporation, Kingsport, Tenn., has granted the Fairmont and Link-Belt companies an exclusive license to manufacture, sell and install the American table under its patents. The American Coal Cleaning Corporation, however, retains the right to continue to sell its tables to the coal industry direct. Fairmont and Link-Belt also announce that completely modernized dry-cleaning equipment has been developed and is now being offered.

The American Coal Cleaning Corporation is the originator of the pneumatic treatment of coal, the first commercial plant having been placed in operation in 1920. The combined installed capacity of its plants is in excess of 36,000,000 tons per year.

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U. W. Mining Institute Set

The thirteenth annual mining institute sponsored by the College of Mines, University of Washington, Seattle, will be held Jan. 15–20. Meetings at the Mines Laboratory during the first four days will be featured by lectures and laboratory demon-

strations by members of the College of Mines staff on mining, metallurgy, ceramics and related subjects. Operators and engineers also will speak on live topics. In addition there will be displays and demonstrations by manufacturers' representatives.

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Ozanic Says N.L.R.B. Plan Helped Lewis Union

Testifying before a House investigating committee at Washington, D. C., on Dec. 13, Joe Ozanic, president, Progressive Mine Workers, charged that the National Labor Relations Board has followed a "plan" to give the United Mine Workers "a way out" in the fight for supremacy between the two unions. According to Mr. Ozanic, the plan was embodied in a controlling decision which certified the U.M.W. as the bargaining agent for all the coal mines in a specified geographical area. This was done, he alleged, despite provable majorities for the Progressives in individual mines affected.

As a result of this plan, he said, the U.M.W. and employers in the field had forced thousands of Progressive members to switch to the U.M.W. and pay its dues, regardless of their own desires in the matter.

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Obituary

ABNER A. LIGGETT, 56, vice-president and treasurer, Raleigh Coal & Coke Co., and president, Knights Products, Inc., Cincinnati, Ohio, died Dec. 20 after a short illness. The Raleigh operations are in southern West Virginia, its output being marketed by the Knights Products organization.

MARSHALL ALEXANDER SHUFF, 72, purchasing agent for the Virginia Iron, Coal & Coke Co., Roanoke, Va., since 1917, died Dec. 5 at his home in Pulaski, Va., after a long illness.

J. S. LEWIS, 65, vice-president of the Logan County Coal Corporation and the Amherst Coal Co., both operating in Logan County, West Virginia, died Dec. 5 of a heart attack in a Reading (Pa.) hospital.

ELMER H. LAWALL, 78, consulting engineer, who was well known in the anthracite region of Pennsylvania, died Dec. 8 at his home in Wilkes-Barre, Pa., after a long period of failing health. At various times he was general manager of the New York, Susquehanna & Western Railroad & Coal Co.; general superintendent, Lehigh & Wilkes-Barre Coal Co., and vice-president, Bottom Creek Coal & Coke Co.

JAMES K. KENNEDY, vice-president, National Coal & Coke Co., died at his home in Birmingham, Ala., Dec. 14 after an illness of about a year. Prior to joining the National organization he had been with the DeBardeleben Coal Corporation.

CHARLES W. MCREAKEN, recently division superintendent in the Midland area, Peabody Coal Co., died Nov. 30 at his home in Marion, Ill. He had formerly been division superintendent in the West Frankfort area, and previous to that was superintendent of the company's No. 9 mine.

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He had been in ill health since suffering a stroke a year ago.

THOMAS H. HUDDY, 69, who was an inspector for the former Bituminous Coal Commission until his retirement because of ill health, died Dec. 12 at Williamson, W. Va. A native of Cornwall, England, his experience in the coal industry began at Nelsonville, Ohio. He then joined the Jeffrey Mfg. Co., subsequently becoming superintendent of a mine at Ellsworth, Pa. Then followed service with the Hanna Coal Co. as general manager of its operations at Boomer and on Paint Creek. In 1920 he became general manager of the Sudduth Fuel Co. at Huddy, Ky., and also manager of the Bailey Fuel Co., Toler, Ky., both subsidiaries of the Dickinson Fuel Co.

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Dun Glen Tipple Being Rebuilt

Construction of a new tipple at the Dun Glen mine of the Hanna Coal Co., Dun Glen, Ohio, has begun and will be rushed to completion. The old structure was completely destroyed by fire on Nov. 12.

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Stoker Men's Meeting Planned

The annual meeting of the Stoker Manufacturers' Association will be held June 6 and 7 at the Homestead Hotel, Hot Springs, Va. Meantime, according to E. C. Sammons, president of the association, intensive study is being given to the problem of obtaining a larger share of the new-home building business. The spring quarterly session of executives of S.M.A. will include conferences with coal-research officials on problems concerning the mechanical removal of bituminous ash and development of automatic coal-burning "packaged" heating units.

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Industrial Notes

KOEHLER MFG. CO. announces formation of WHEAT LAMP SALES, INC., to handle the distribution and servicing of Wheat and Koehler lamps. Headquarters will be at 1001 Bessemer Building, Pittsburgh, Pa., under supervision of A. C. Dick. Morley S. Sloman has joined the staff as district manager in charge of the western Pennsylvania, northern West Virginia and Ohio territories. Mr. Sloman is well known in these areas through former association with the sales organization of the Sullivan Machinery Co.

WORTHINGTON PUMP & MACHINERY CORPORATION has elected Maynard D. Church as a vice-president. He will continue as president of the Moore Steam Turbine Corporation, a Worthington subsidiary.

LINK-BELT CO. has appointed Ralph M. Hoffman as assistant to the president with headquarters at the general offices in Chicago. For the last eight years he has been vice-president and sales manager of the company's Pacific Division.

WHITCOMB LOCOMOTIVE CO., a subsidiary of the Baldwin Locomotive Works, has named B. L. Beck district sales manager with offices at 1010 Pine St., St. Louis, Mo.

John R. Heckman has joined the sales department operating from the Chicago office.

Ajax Flexible Coupling Co., Westfield, N. Y., has appointed R. L. Johnstone as manager of its shaker division. His appointment is coincidental with the announcement of a complete line of standardized Ajax screens, feeders and conveyors.

H. B. Gay, third vice-president and general sales manager, as well as a member of the board of directors, of Electric Storage Battery Co., Philadelphia, Pa., has retired from active service after 38 years in the employ of the company. Starting in the sales department, he was successively manager of the Baltimore and Cleveland branches, becoming general sales manager in 1920.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn., makers of pressure gages, safety valves, thermometers and globe valves, has advanced Louis H. Brendel to assist C. H. Butterfield, general sales manager. Mr. Brendel's new duties will include supervision of sales promotion and jobber relations for the Ashcroft American Gauge Division, Consolidated Safety Valve Division, American Schaeffer & Budenberg Instrument Division, and Hancock Valve Division.

Cincinnati Mine Machinery Co., Cincinnati, Ohio, has appointed the Penn Machine Co., Johnstown, Pa., as representative for its chains, bits, bars and bit cutting machines in Pennsylvania, eastern Ohio and northern West Virginia.

Joseph T. Ryerson & Son, Inc., Chicago, has become distributor of McKay certified stainless-steel electrodes. They will be stocked by all the Ryerson branches as well as by the central plant in Chicago.

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Washery Works Double-Shift

Pyramid Coal Corporation, Pinckneyville, Ill., has its new 800-tons-per-hour McNally-Pittsburgh washery in double-shift operation. Blaine Wilkins has charge of the first shift and Herbert Harris is directing the second shift.

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To Operate Evans Colliery

Lloyd Neumeister has signed a lease to operate the Evans colliery, near Beaver Meadows, Pa., which has been idle for some time. The new lessee will be known as the Evans Coal Co., with these officers: Mr. Neumeister, president; Joseph M. Hornick, vice-president, and Charles Cassler, secretary-treasurer.

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"Shadow" Wins Radio Award

"The Shadow," radio program of the Delaware, Lackawanna & Western Coal Co., marketer of "blue coal," has been awarded the Radio Varieties Gold Cup as the most outstanding program in the radio field of half-hour dramatic shows. The award is made on the basis of "excellent dramatic quality, outstanding production, and able service in the prevention of crime." The cup is presented by the magazine *Radio Variety*.

Hillcrest and Mohawk Merge

Hillcrest Collieries, Ltd., Hillcrest, Alberta, Canada, in liquidation, announces that an amalgamation with the Mohawk Bituminous Mines, Ltd., has been effected, as a result of which the mines of the Hillcrest company have been closed. A new company, Hillcrest Mohawk Collieries, Ltd., has been incorporated in Alberta with a capital of $1,250,000.

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Wage-Hour Law Digest

A pamphlet entitled "Employers' Digest of the Fair Labor Standards Act of 1938," has been issued by the U. S. Department of Labor. This brochure describes in simple language the most important provisions of the Wage-Hour law as it affects employers. Particular stress has been laid upon the calculation of overtime pay and the record-keeping requirements of the act. On page 6 of the pamphlet are lists of wage-and-hour publications, including interpretive bulletins, and the addresses of offices of the Wage and Hour Division throughout the country, where further information may be obtained.

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"Stoker Etiquette" Defined

A new service manual to aid retail coal merchants and domestic stoker owners, entitled "Stoker Etiquette," is being distributed through producing and selling companies affiliated with Appalachian Coals, Inc., Cincinnati, Ohio. Sections are devoted to describing southern high-volatile stoker coals, coal size, starting fire, fuel and air ratio, firebox draft, ash and clinker, frequency of cleaning fire, hold fire control, safety controls, room thermostat, the combustion process, and suggestions for overcoming operation difficulties.

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I. C. RR. Collates Mine Data

Location and description of coal mines on the Illinois Central RR., including names of operators, seams and maps of various fields, are given in Circular 44-H, issued by the carrier. The areas covered include Alabama; central, northern and southern Illinois; Indiana, and west Kentucky. Also included are an alphabetical list of coal washers in Illinois and Kentucky and comparative data on coal, oil and gas fuels.

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Trade Literature

Arc Welders—Lincoln Electric Co., Cleveland, Ohio. Welder Specification Bulletin No. 308 outlines a large number of applications coming within the range of the 200-amp. Lincoln "Shield-Arc Junior" welder, illustrating a number.

Arc-Welding Electrodes—General Electric Co., Schenectady, N. Y. GEA-1546F describes types, uses and processes, together with advice in selection of proper electrodes. Specifications, qualifications and other data are included.

Arc-Welding Electrodes—McKay Co.,

Pittsburgh, Pa. Catalog E-16 includes tentative specifications for iron and steel arc-welding electrodes approved by the American Welding Society and the American Society for Testing Materials, also advice as to proper discrimination among different mild-steel electrodes, according to nature and conditions of work.

CONDENSATE PUMP UNITS—Roots-Connersville Blower Corporation, Connersville, Ind. Bulletin 260-B14C covers the company's complete line of automatic condensate return units for vented gravity systems, said to be suitable for all sorts of steam processing plants.

HOIST—Sullivan Machinery Co., Michigan City, Ind. Bulletin 76-R is devoted to the Class K-111 reversible "Piston-air" single drum hoist, equipped with large-diameter drum, heavy-duty Lubriseal ball bearings and four-cylinder reciprocating air motor.

MERCURY-ARC RECTIFIERS—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Folder tells in word and picture some of the uses of these units.

SPECIAL ALLOYS—Duraloy Co., Scottdale, Pa. Bulletin 3926-G shows range of these alloys and their uses, citing typical applications and advantages.

TURBINE PUMPS—Roots-Connersville Blower Corporation, Connersville, Ind. Bulletin 260-B11D covers turbine pumps for industrial applications. Design features are described in detail, with a cutaway view of the pump, diagram of the internal seals, typical performance curve, and standard specifications.

WELDING GENERATOR—Wilson Welder & Metals Co., New York City. Bulletin Form No. ADW-15, on the Wilson "Hornet" electric arc-welding generator, gives an analysis of the arc welder's problems, followed by a discussion of the way this analysis was applied to the design of the Wilson "Hornet." Characteristics treated are its exterior design, simple adjustment, self-contained exciter, locked polarity reversal, single-pole control and portability.

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Accident Fatality Rate Dips For Soft Coal: Up for Hard

Accidents at coal mines in the United States caused the deaths of 97 bituminous and 26 anthracite miners in October last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 45,255,000 tons, the accident death rate among bituminous miners was 2.14 per million tons, compared with 2.23 in the corresponding month of 1938.

The anthracite fatality rate in October last was 5.25, based on an output of 4,955,000 tons, against 4.07 in October of the preceding year.

For the two industries combined, the death rate from accidents in October last was 2.45, compared with 2.43 a year earlier.

Fatalities during October last, by causes and States, as well as comparable rates for the first ten months of 1938 and 1939, are shown below:

UNITED STATES COAL-MINE FATALITIES IN OCTOBER, 1939, BY CAUSES AND STATES

	Underground										Open-cut and Surface				
State	Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft	Mine Cars	Falls of Persons	Other Causes	Total Surface	Grand Total
Alabama	1	..	..	..	..	1	..	1	3	..	..	..	..	..	3
Arkansas	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1
Colorado	2	..	2	..	..	..	2	..	6	..	..	..	..	..	6
Illinois	4	2	2	..	..	..	1	..	9	..	..	..	..	..	9
Iowa	..	1	..	..	..	..	1	..	2	..	..	..	..	..	2
Kansas	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1
Kentucky	13	..	2	..	..	1	..	1	17	..	..	..	..	..	17
Maryland	..	1	..	..	..	..	..	..	1	..	..	..	..	..	1
Ohio	..	..	1	..	..	..	..	..	1	..	..	..	..	..	1
Pennsylvania (bit.)	10	2	2	..	..	1	1	..	16	..	..	..	..	..	16
Utah	..	..	1	..	..	..	..	..	1	..	..	..	..	..	1
Virginia	..	1	1	..	..	..	..	..	2	..	1	..	..	1	3
Washington	..	..	1	..	..	..	..	..	1	..	..	..	..	..	1
West Virginia	19	1	9	2	..	2	1	..	34	..	1	..	..	1	35
Total (bituminous)	51	8	21	2	..	5	6	2	95	..	2	..	..	2	97
Pennsylvania (anthracite)	15	3	3	..	1	..	..	1	23	1	..	1	1	2	26
Grand total	66	11	24	2	1	5	6	3	118	1	2	1	1	4	123

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–October, 1938 and 1939

	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
Cause	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939
Underground;												
Falls of roof and coal	391	381	1.448	1.235	104	107	2.754	2.486	495	488	1.608	1.388
Haulage	126	117	.466	.379	19	25	.503	.581	145	142	.471	.404
Gas or dust explosions;												
Local	18	10	.067	.032	2	2	.053	.070	20	13	.065	.037
Major	60	28	.222	.091	18	...	.477	.....	78	28	.253	.080
Explosives	23	9	.085	.029	11	13	.291	.302	34	22	.111	.062
Electricity	38	37	.141	.120	2	2	.053	.046	40	39	.130	.111
Machinery	17	21	.063	.068	....	....	....	....	17	21	.055	.060
Shaft	6	2	.022	.007	3	5	.079	.116	9	7	.029	.020
Miscellaneous	18	12	.067	.039	11	9	.291	.209	29	21	.094	.060
Total underground	697	617	2.581	2.000	170	164	4.501	3.810	867	781	2.816	2.222
Stripping or opencut	7	6	.026	.019	8	5	.212	.116	15	11	.049	.031
Surface	21	23	.078	.075	8	12	.212	.279	29	35	.094	.100
Grand total	725	646	2.685	2.094	186	181	4.925	4.205	911	827	2.959	2.353

* All figures subject to revision.

WHAT'S NEW IN COAL-MINING EQUIPMENT

DUST COLLECTION; DRYING SYSTEM

Multiclone dust collectors, using the cyclonic principle, are offered by the Western Precipitation Corporation, Los Angeles, Calif. Built with metallic tubular construction, using tubes as small as 3 in. in diameter, the manufacturer asserts that the capacity of any Multiclone assembly is an exact multiple of the capacity of its individual tubes, it being possible to build units of any desired capacity. Advantages claimed are: efficiency, compactness, accessibility, low installation cost, economy and absence of fire hazard.

Polyclones, operating under the same principles as Multiclones, employ larger tubes, ranging from 16 to 96 in. in diameter.

The Peebles spray drying system, also offered by Western Precipitation, is said to have overcome many of the disadvantages of the early cumbersome types. Merits cited by the manufacturer are compactness, speed, reliable devices for both manual and automatic control, high quality of output, and almost instantaneous recovery of powder from solutions or suspensions in one step.

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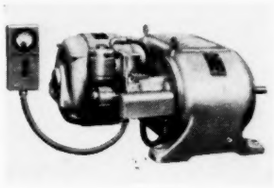
LUBRICATION METHOD; SPEED INDICATOR

U. S. Electrical Motors, Inc., Los Angeles, Calif., has devised a new method of lubrication for motor bearings known as Lubriflush. Through a duct leading from the outside of the motor new lubricant is injected to the inner side of the bearing with a pressure gun. A drain is placed on the opposite side of the bearing underneath. As new lubricant is injected, the old lubricant is forced out of the bearing, and before the new lubricant reaches the drain exit it must first flush the entire bearing and chamber. This system is said to eliminate the evil results of sludgy, worn-out lubricant, providing a method of ejecting the old devitalized grease so that the bearing is replenished with clean lubricant throughout its retaining chamber. The grease fitting and drain plug are easily accessible.

A new electric remote speed indicator for the U. S. Varidrive motor has been developed. This device consists of a simply constructed meter as an indicator mounted in a compact box with the pushbutton for controlling the electric pilot motor that changes the speed. The indicator is neatly calibrated in divisions 1 to 10; but scales calibrated to suit the customer's requirements are obtainable. By pushing the high or low button the speed is immediately changed and this change registers on the indicator. The remote indicator station also may be replaced by a single pushbutton station or by automatic control equipment, such as cyclic relays, thermostats, pressure or cam mechanisms.



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FRONT-DUMPING SHOVEL

Speeder Machinery Corporation, Cedar Rapids, Iowa, offers the Johnson front-dumping shovel, nicknamed "Speedersaurus" or "double-jointed rip-snatching scooper-dooper." Using a powerful chain crowd with double leverage on the cutting edge, the action is somewhat like that of a trench hoe, but in reverse. This patented shovel attachment, developed for use with Speeder or Link-Belt convertible machines, has been designed for handling material that cannot advantageously pass through the bucket and for subgrading work where a skimmer might ordinarily be used. As there is no hoist line running down to the top of the bucket, it can work in places where an ordinary shovel might foul.

The new unit is offered as being particularly suited for land-clearing work, digging out trees, stumps, boulders; drainage ditch clean-outs and the building of new ditches; ripping up and loading old concrete or macadam paving; loading peat moss, etc. It is stated that in loading odd shapes of stones or torn-up pavement, the operator can balance a huge slab on the bucket and practically lay it into a truck.

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NEW HAULAGE UNIT

Linn Mfg. Corporation, Morris, N. Y., offers a new type of haulage unit, known as the Model C-5, which can be instantly converted from wheel to track operation, or vice versa, simply by throwing a control lever mounted at the driver's position. Developed to meet a need for a vehicle of flexibility and broad utility, this unit is said to be suited for road building and maintenance, haulage problems of coal stripping, etc. Operating on wheels, the drive is on the front wheels (the traction unit idling) and the load distribution is 50–50 on front and rear wheels, with a maximum speed of 35 m.p.h.

When track operation is desired, the operator pushes the control lever and the rear wheels are raised hydraulically; the wheels can be raised to allow 9 in. of road clearance or they can be allowed to trail or float behind the traction unit. When operating on tracks, the load distribution is 75 per cent on the tracks and 25 per cent on the front wheels, with the drive on the tracks and front wheels simultaneously. Maximum speed, loaded, on tracks is 12 m.p.h.

The hydraulic jackknife lever unit which raises and lowers the rear wheels locks off center so that when operating on wheels the load is carried on the rear axle only, never on the cylinder. The body capacity is 5 tons, and the chassis weight, with cab, about 11,500 lb. Gasoline or diesel power is optional.

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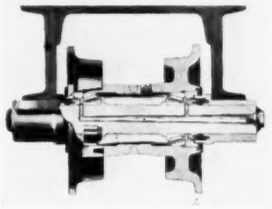
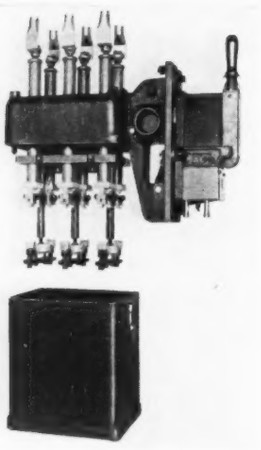
TRUCK-WHEEL ASSEMBLY; CIRCUIT BREAKER

A new positive-seal truck-wheel assembly for tractors which will eliminate daily roller greasing is offered by Allis-Chalmers Mfg. Co., Milwaukee, Wis. In this new assembly ordinary bearings are replaced by tapered roller bearings with a positive-seal arrangement that keeps in lubricating oil and keeps out dirt, dust, mud and grit. According to A-C engineers, lubrication is required only once every 200 operating hours instead of every eight hours, as heretofore. This arrangement not only keeps out dirt and other foreign materials but is so constructed that all of the old oil is forced out each time the assembly is lubricated.



A new switchboard-type oil circuit breaker capable of wide application to central-station and industrial service is announced by the A-C Boston works. Designated as Type



KD-20, this 50,000-kva. interrupting rating breaker is of particular interest, according to the manufacturer, because the three poles are arranged one behind the other as viewed from the front or operating end of the breaker. The arrangement of the bushings so obtained eliminates the necessity of crossing the leads in certain applications of open- and inclosed-type switchboards.

The Type KD-20 is equipped with large butt-type arcing contacts. The main current-carrying contacts, silver-plated, are of the wedge and finger type for 600 amp. and wedge and laminated brush type for 1,200 and 2,000 amp. Other features include: Bakelain bushings, inclosed low-inertia high-speed mechanisms, and vents to permit escape of gases incident to interruption. Furnished for 600 amp. at 15 kv., it is arranged for flat-surface mounting or for mounting in cells, switchhouses, cubicles, metal-clad switching equipment, and safety inclosed switchboards.

A-C Centrifugal Pump Division announces the inclusion of ball bearings as standard equipment on nearly all of its line of single-stage centrifugal pumps where peripheral speeds are not jeopardized thereby. Since many purchasing engineers still prefer sleeve bearings, these bearing housings are designed so that either type of bearing may be accommodated.

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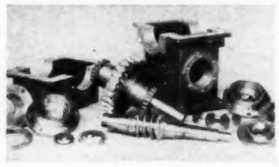
SPEED REDUCERS

A standard line of heavy-duty speed reducers incorporating the Cone area-contact type of worm gearing is announced by the Michigan Tool Co., Detroit, Mich. Capacity for capacity, says the manufacturer, the new units are roughly two-thirds the size of standard worm-gear reducers, with proportionate reduction in weight. The larger area per tooth and greater number of teeth in contact with Cone worm gearing, it is said, permits a material reduction in center distances for the same load capacity; unusually high efficiencies and long life also are claimed.



Part of the high efficiency is said to be attributable to the lubrication characteristics of the gearing, the entering worm thread spreading oil on the contact surfaces instead of the oil being squeezed out; also contributing is the elimination of the necessity for heat-treatment after finish machining, thus avoiding heat-treatment errors. The new units are all of the vertical worm-on-bottom type.

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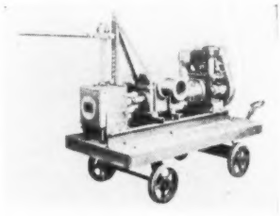
CORE DRILLS

Acker Drill Co., Scranton, Pa., offers an improved core drill known as the Model LD. Simple to operate, with no feed gears, feed screw or rack and pinions, downward travel is accomplished through a cushioned hand lever; pressure may be regulated quickly to suit hard or soft ma-



terial. Core drill and winch head are direct-connected to any power motor; drill is disengaged when winch is used to drive casing. Hardened bevel gears run in oil in a tight case. The drill may be mounted on skids, motor truck or trailer.

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BEARING UNITS

Stephens-Adamson Mfg. Co., Aurora, Ill., is now featuring self-contained flange and take-up bearing units. Sealmasters are self-aligning units with seals built in as an integral part of the bearing proper—independently of the housing. These are said to seal the bearing effectively against all foreign material and to retain lubricant. Misalignment of the shaft, according to the manufacturer, cannot interfere with the effectiveness of the seal, for even though the bearing be removed from the housing, dirt cannot enter the housing.

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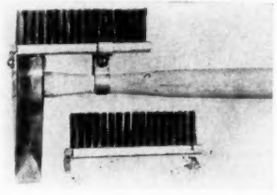
COMBINATION WIRE BRUSH AND CHIPPING HAMMER

A new convenience tool for welding departments is the Triplex Welders' Chipper, manufactured by St. Pierre Chain Corporation, Worcester, Mass. It consists of a drop-forged-steel chipping hammer with hardwood handle having a heavy-duty wire brush rigidly mounted on the top side. The hammer chisel chips and breaks the scale, then the tool is turned in the hand and the brush is used to clean the surface. The wire brush is held in place by stout bolts which can be loosened to reverse the brush



and thus get full wear from it or to remove it and insert a new brush. The chipper was designed especially for quick and thorough removal of slags formed on top of weld metal when heavily coated electrodes are used, but it is equally useful for removing rust and scale to provide a clean, bright surface for welding.

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CONSTANT-LEVEL OILER

A new line of automatic constant-level oilers with unbreakable reservoirs and adjustment oil-level features is offered by the Trico Fuse Mfg. Co., Milwaukee, Wis. These units are said to maintain automatically the proper oil level in ring or ball bearings, gear and pump housing, etc., thus reducing maintenance expense, bearing

failures, waste of lubricant, oil-soaked motor windings, damage to materials, fire hazards and other dangers which accompany hand-oiling methods.

The reservoir, attached to the lower casting by a threaded spout, is easily removable for convenient cleaning and refilling. Made in 1-, 2-, 4- and 8-oz. capacities, with all bottles interchangeable, there are two styles for standard-surge and high-surge levels having side outlets only and also side and bottom outlets for bottom connection or for draining purposes.

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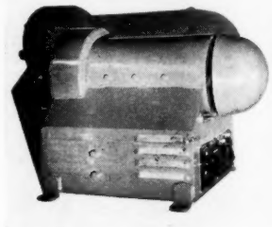
HARD-SURFACING POWDER; WELDER; ELECTRODE

A hard-surfacing powder, "Surfaceweld A," for application with the carbon arc, produced by the Lincoln Electric Co., Cleveland, Ohio, is a fine-grained alloy powder said to give a smooth, dense, hard surface. According to the manufacturer, when properly applied, this material will give a coating with a hardness of approximately Rockwell 54C.

A new small arc-welding machine, known as the "Shield-Arc Junior," is announced by Lincoln. Direct coupled to a gasoline engine or belted to a power take-off from an engine, or connected by belt to line shafting or an electric motor, this welder generates a smooth



current for a wide variety of arc-welding applications. It can be used with either bare or shielded-arc-type electrodes. Rated at 200 amp. and with a current range, welding duty, 30-volt arc, of 60 to 250 amp., the machine is 29⅝ in. long over pulley, 18 in. high and with a base 15½x19⅝ in. Net weight is 320 lb.

A new arc-welding electrode which it is said will facilitate finishing operations on welded products by eliminating the need of dressing or smoothing welded seams in many applications is announced by Lincoln. Known as "Fleetweld 10," it is designed particularly for finish bead welding in downhand position. It is made in ¼- and $\frac{5}{16}$-in. sizes in 18-in. lengths.